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THE MONTH

SOME knowledge of the progress being achieved in the field of dentistry is obviously essential for the practitioner who wishes to give the best service to his patients. As a reader wrote recently: 'All doctors in general practice have to see patients in whom there is an obvious dental problem, but few of us hear anything of the many advances in dental care'. During the fifteen years that have elapsed since we last published a symposium on the subject we have published a number of occasional articles dealing with the subject, but we felt that the time had come when we could profitably devote another entire symposium to the problem of 'Dental and oral disease'. The subjects chosen for inclusion are those which have a practical bearing for the family doctor, and we are grateful to all our colleagues in the dental profession who have so willingly accepted the invitation to contribute to the symposium. We have had no hesitation in assuring them that the time and effort they have spent in preparing their articles will be fully appreciated by all our readers.

The Symposium

THE problem of dental health is by no means restricted to this country. According to a recent issue of 'Progress in Health Services', the bulletin of the Health Information Foundation of New York, 'untreated dental conditions are among the most common of all diseases afflicting the American people'. With that American gift for dramatizing statistics, it is estimated that 'the 180 million residents of the U.S. in 1960 had at least 700 million unfilled cavities', and the figure is increasing each year. The incidence of periodontal disease ('pyorrhœa') is equally disturbing: 83 per cent. of gingivitis in a group of 10-year-old children in Chicago, whilst the incidence of periodontal disease in adults rises to a peak of 80 per cent. in those aged 60 to 69 years. Approximately 13 per cent. (22 million) of the population are edentulous.

American Dental Health

As in the United Kingdom, the most worrying problem of all is the neglect of children's teeth, and public apathy on the whole subject. The commission on the survey of dentistry in the United States, set up by the American Council on Education, in its report published earlier this year summed up the contributory factors to this disturbing state of affairs as follows: the low priority set on dental care by the American people; the shortage and maldistribution in the number of practising dentists; the inability of many to pay for comprehensive dental care; the reluctance of dentists to increase their productivity.

Computers in Diagnosis

ARE electronic computers going to revolutionize the practice of medicine? Such is the intriguing question to which our American colleagues are trying to find the answer. A former President of the American Medical Association has said that 'our rapidly expanding population will require either more care from more doctors, or some means by which people can maintain health and need less medical service. Automation linked with preventive medicine appears to be the answer', whilst two lay commentators on the current American scene have commented that 'electronic computers and other mechanical devices for even faster history-taking and diagnosis appear just around the corner'. A recent leader in the *Journal of the American Medical Association* (1961, **177**, 205) raises the possibility that 'the training of large numbers of expert diagnosticians may be unnecessary in the future and that the general practitioner, trained to collect information accurately from his patient and to administer certain forms of treatment expertly, may, with the help of a computer (as accessible as his telephone), handle the bulk of medical practice once again'.

Fantastic though such an impersonal means of diagnosis may appear to the old-fashioned practitioner, there is increasing evidence that, used aright, it may well prove of value. The basis of any such method, of course, is a code such as the Cornell Medical Index, which consists of 195 questions concerning the patient's history, past history, family history, symptoms, and so forth. In one investigation, by the use of this index and a computer, a correct diagnosis of 60 diseases was made in 48 per cent., the corresponding accuracy of what might be described as old-fashioned diagnostic methods being 43 per cent. Using different basic data, H. R. Warner and his colleagues (*Ibid.*, p. 177) have reported that in 36 cases of congenital heart disease the diagnosis reached electronically 'agrees with the actual diagnosis made by physiologic studies and observation at surgery at least as often as does the most probable diagnosis estimated by three experienced cardiologists from the same clinical information'. The practical snag, of course, is that the computer, like its human opposite number, the statistician, is entirely dependent upon the right question being asked and an accurate answer being given.

Jehovah's Witnesses

THAT section of the Christian community, known as Jehovah's Witnesses, has recently acquired a certain amount of notoriety on account of their refusal to receive blood transfusions. Inevitably, when the life of an infant or child has been at stake, emotional bias has leapt to the fore and there has been a tendency for both doctors and laymen to adopt an attitude of intolerance which is not in keeping with either the tenets of the Christian faith or the dictates of civilized communities. Ignorance of the true facts of the situation has probably been as responsible as anything for this intolerant reaction. As an antidote to such ignorance an impartial review of the subject by M.

Minuck and R. S. Lambie (*Canad. med. Ass. J.*, 1961, **84**, 1187) can be recommended.

Blood transfusions are banned to Jehovah's Witnesses because they violate the Holy Scriptures. According to their beliefs, 'God has forbidden man to take another's blood in any form into his body'. Should a Witness disobey this scriptural edict, knowingly and without repentance, he brings upon himself eternal death. This edict is not applied without charity. If a Witness does not know that he has received a transfusion, either through shock or anæsthesia, for instance, he is not held responsible for his action. Even if he does allow blood to be transfused, and it is a first offence, he can beg forgiveness. Of the sincerity of this belief there can be no doubt, and the practical question therefore arises as to how the situation should be dealt with. This is no mere academic problem, because the sect is spreading steadily. It is estimated that there are now 870,000 active 'ministers' in the world, and in Canada alone the numbers have risen from 101 in 1901 to 34,596 in 1951. Various legal measures have been suggested for dealing with the difficult situation that may arise when the life of a child is involved. The State of Manitoba, for instance, has enacted a law enabling blood transfusions to be given promptly to children despite parental objections if, in the opinion of the attending surgeon, the child would die if transfusion were withheld. Minuck and Lambie, however, suggest that there may be other less drastic methods of dealing with the situation, particularly in adults—and these they discuss in detail. The basis of their recommendations is that tolerance and understanding which are the foundation of all good medicine.

Grand Guignol

THOSE who have read any of Sir Frederick Treves' works, especially his collection of short stories entitled 'The Elephant Man', will not need to be reminded that he was as facile with his pen as with his scalpel. There has just come into the possession of the Royal College of Surgeons of England some of his notebooks and one of the cases from these has been published in the annals of the College (*Ann. Roy. Coll. Surg. Engl.*, 1961, **28**, 384). Entitled 'The Case of Sir John Millais', it tells the story of how Treves performed an emergency tracheotomy on Sir John Millais in circumstances more resembling a medical witches' cauldron than the library at No. 2 Palace Gate on May 11, 1896.

Millais had been ill for many months with carcinoma of the larynx when, late in the evening of Sunday, May 10, 1896, his general practitioner asked Treves to come and perform a tracheotomy as Millais was *in extremis*. When he reached Millais' house in Palace Gate, at about 1.45 a.m. on the Monday morning, he found Millais lying on a low bed in the ill-lit library. The family had retired for the night, and the only other person present, apart from the family doctor, was what Treves took to be a housemaid who 'stood in the shadow like a sentinel, immobile and numb'. There was

not a minute to spare. The family doctor prepared to give chloroform. Treves knelt on the floor, by the side of the bed, the knife in his hand, and the 'ineffectual woman' knelt on the floor on the other side of the bed, holding the lamp. 'This she did with the indolent precision of a mesmerized person and the stolidness of a deaf-mute'. Suddenly Millais fell back apparently dead, and practically fell on the floor from the low-set bed. Treves plunged his scalpel into the trachea and, after pressure on the chest, Millais took a long deep breath. By this time patient, doctor and surgeon were practically on the floor 'like three people in a street fight. There were crimson patches of blood on the crumpled sheets. Everywhere was intense disorder. The bed itself was contorted as if by a whirlwind, the room was still and full of shadows, a clock was tolling the hour of two'. As if this were not macabre enough, at this stage 'the ghostly woman placed the lamp very deliberately on the floor, and proceeded to crawl slowly out of the room on her hands and knees. The door was ajar and she crept out into the hall like an uncouth pantomime dog. She uttered no word, made no sound and was never seen again'. So did the Royal Surgeon save the life of the President of the Royal Academy in the heart of fashionable London in the heyday of the reign of Queen Victoria. It was three months later —almost to the day—on August 13, that Millais died.

A Centenarian Passes

With cryptic brevity, worthy of the best traditions of British journalism, the *Medical Press* announced in its issue of September 27 that with that issue it 'ceased publication after 122 years of existence as an independent weekly medical journal'. Its progenitor, the *Dublin Medical Press*, was launched in 1839, with an 'introductory address' as notable for its prolixity as the 'vale' was for its brevity. In January 1866, it amalgamated with the *Medical Circular* to become the *Dublin Medical Press and Circular*. Before long 'Dublin' was omitted from the title, and by the end of the year the publisher was A. A. Tindall. Two years later the printing of the journal was transferred to England and, in the words of the official historian of the journal, 'from that date the *Medical Press and Circular* ceased to be an Irish periodical and became increasingly English'. One of the many characteristics of its editors has been their long period in office. Arthur Jacob, the founder and first editor, and his son were in editorial control for sixty-two years, and the editor of the final issue—Sir Cecil Wakeley—had occupied the editorial chair since 1933.

The regret felt at the passing of this notable centenarian is enhanced by the reason for its passing—'the pressure of constantly increasing costs'. Thus yet another casualty occurs in the persisting struggle in which every journal in the country is engaged. The proprietors and editorial board of the *Medical Press* have at least the consolation of being able to look back upon a proud record of service to the medical profession.

THE PROBLEM OF DENTAL CARIES

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It is usual for a widespread disease to present a variety of problems and it is certainly true that dental caries which is widespread has a number of perplexing problems related to it. As a rule if the cause of a disease is known a cure is not very difficult to find, but this is not the case with caries. The cause is known, the cure is known and the method of prevention is also known; yet caries is rampant, for the recommended way of prevention is unacceptable to the majority of patients. It is unacceptable not because it is difficult to apply and not because it is expensive, but because it means an alteration in the dietary habits which have become part of the Western way of life in the twentieth century.

A PAINLESS DISEASE

Dental caries is a disease of the crown of the tooth caused by acids produced by bacteria from carbohydrate residues derived from the diet. Initially the destruction is confined to a small area and is better described as a penetration of enamel. In the later stages of the disease the enamel is lost in sizeable pieces which fracture from the tooth, usually during eating, and for the first time the patient is conscious of the cavity which has been symptomlessly developing in the dentine for the past months and which has been hidden by the thin shell of enamel. Contrary to popular belief, dental caries is a painless disease; this is why the appearance of the cavity is often the first indication that the tooth has been involved. The pain appears when the disease has spread in the dentine to such an extent that the pulp becomes irritated and then inflamed but, in the absence of pulpitis, enamel and dentine are destroyed painlessly. Once a cavity has formed there is only one line of treatment other than extraction and that is filling the tooth.

THE 'ENAMEL ORGAN'

Enamel cannot repair itself. It cannot even protect itself for the enamel-forming cells degenerate on the completion of their task before the tooth erupts. The enamel-forming cells, the ameloblasts, come from the basal layer of the primitive mucous membrane and, proliferating, form the enamel organ which has four distinct layers. Towards the end of enamel formation the enamel organ becomes gradually thinner: first it loses its layered structure, then its cellular structure and its final form is a thin acellular membrane which is firmly adherent to the surface of the enamel.

This membrane, known as Nasmyth's membrane or the enamel cuticle, is not lost during eruption and covers the enamel completely for a short period after the tooth has erupted. Since it is a thin structure it is easily worn away, especially from those parts of the tooth subjected to friction

from food during chewing and from the normal contact of the lips, cheeks and tongue during swallowing and speaking. Thus soon after eruption parts of the tooth lose the membrane leaving the underlying enamel exposed to the oral fluids and food. These areas are known as the self-cleansing areas. The other parts, not easily cleaned naturally, especially the mesial and distal surfaces, around the neck of the tooth and in the fissures, are the vulnerable areas; but at least they have Nasmyth's membrane as an initial barrier to the attack by the carious process. The membrane has the important quality that it is not readily soluble in weak acids.

THE 'BACTERIAL PLAQUE'

There is a natural tendency for all parts of the mouth to be covered by a thin mucin film deposited from the saliva. In the majority of areas it is quickly removed by movement and contact with other structures. In the vulnerable areas of the tooth, however, it gets a chance to develop and remain undisturbed for quite long periods each day. Even during eating it is not necessarily always disturbed. Nasmyth's membrane offers a convenient surface on which the film can adhere and, once formed, bacteria land on it and find congenial conditions. Soon bacterial colonies develop on it. The *Leptothrix buccalis*, with its branching filaments, is an early arrival and weaves its network allowing more mucin to form over it. Streptococci and lactobacilli are also frequent colonizers. In addition to the bacteria, food debris and desquamated epithelial cells get incorporated in the film. This film once well established with proliferating bacteria is known as the bacterial plaque.

This is one of the more important structures, if not the most important structure, in the whole of dental pathology for it initiates caries: it forms the foundation for tartar and it is a most important stage in the development of gingivitis and periodontal disease. It must be understood that this film is thin and transparent and almost invisible on clinical examination and it must be differentiated from the very obvious soft white food debris which is often found clinging to the necks of the teeth of patients who persistently eat soft foods and do not brush their teeth. This ***materia alba*** is just decaying food. The plaque is the site of the greatest concentration of bacteria in the mouth. The type of colonizing bacteria is influenced by the character of the food eaten by the patient. If it encourages acid-producing bacteria then caries will result. If it encourages the non-acid-producing bacteria then tartar (calculus), gingivitis and periodontal disease are prone to develop. It is the bacteria in the plaque that constitute the danger. Germ-free rats fed on caries-producing diets do not develop decayed teeth. It is the presence of the acid-producing bacteria that is essential.

Nasmyth's membrane is not readily soluble in weak acids. A plaque which forms on the membrane, even if it is colonized by acid-producing bacteria, will not decalcify enamel until the membrane is removed. This is usually done by proteolytic organisms. When Nasmyth's membrane has

been removed and the plaque is in direct contact with enamel then, if it is left undisturbed and the colonizing bacteria are acid producing, a carious lesion will develop. It is understood to happen in this way.

THE CARIOUS PROCESS

Enamel is composed of inorganic salts of calcium in the form of hexagonal columns called prisms. They are tightly packed together in layers. The layers of prisms by being placed one on top of the other give shape to the crown of the tooth. Between the prisms is an inorganic cementing substance —the inter-prismatic substance—and around each prism is a thin sheath of organic material, whilst extending through the centre of each is a thread of organic matter. Between the layers is also a trace of organic material. The organic material of the enamel is in direct continuity with Nasmyth's membrane. Prism sheaths and the ends of the prism threads and inter-layer material are exposed on the enamel surface when the covering membrane is lost. In addition to the normal organic enamel there are deeper and thicker organic strands called the lamellæ which are thought to represent a defect in enamel formation. These lamellæ also can form weak areas in the enamel. The organic material of the enamel has two parts: one very readily soluble and the other largely insoluble. The acids produced by the bacteria in the plaque dissolve the soluble organic component and are brought into contact with the prisms. These then start to dissolve. The pattern of advance of the carious lesion in the first instance is determined by the distribution of the soluble organic material. There is therefore a partial decalcification of the enamel depending upon what parts of the prism are adjacent to the soluble protein whilst those adjacent to the insoluble protein are protected in the early stages. So the initial entry of the acid and its mode of spread in the enamel are determined by the distribution of the soluble protein.

It penetrates vertically into the enamel in the direction of the dentine but also, by following the organic substance between the layers, it is able to extend laterally and take a curved course towards the dentine. Thus far the attack has been from the surface but as more and more calcium is removed spaces develop below the plaque which are large enough to accommodate bacteria. In the course of time proteolytic bacteria are among those found in the enamel and their activity disintegrates the insoluble organic matter thus exposing the hitherto protected group of inorganic crystals of the enamel. All the elements of destruction are present and active. Now it is only a matter of time until the dentine is reached. When this happens the carious process is given a new lease of life since the structure and composition of the dentine make it more easily destroyed by acids and proteolytic bacteria.

PREVENTION

There are four components to the carious process: the plaque, the bacteria, carbohydrates and the enamel. Without plaque the bacteria cannot remain

in one place long enough to produce acids in sufficient quantity to decalcify enamel. The acid once it has been produced is protected from solution into saliva by the plaque and is in direct contact with the enamel. Without bacteria the acids cannot be produced. Without carbohydrates the acid-producing bacteria are starved. Without soluble calcium salts the enamel would remain intact.

The simple prevention is to restrict the intake of highly refined carbohydrate. This is almost unacceptable advice. The average patient does not value his teeth sufficiently to accept life without sweets, honey, biscuits, sugar-coated buns, bread and jam and a host of cereals and flour products.

The control of bacteria by antiseptics is impracticable in the mouth.

TOOTHBRUSHING

The attack on the mucin film and plaque is the usual way of answering the problem of prevention of caries. The film is deposited from saliva and where there is saliva there will be film. To prevent the formation of film is difficult and the accepted policy has become: 'let it form but remove it soon afterwards'. Toothbrushing is the accepted routine method of removing plaque, cleaning teeth and polishing the enamel. It is important to pay attention to the vulnerable areas when brushing teeth and the presence of stain and food debris can give an indication of the areas which are not self-cleansing. If plaque is thoroughly removed after a meal it will probably have started to reform before the next one but it will be thin, delicate and contain few bacterial colonies and as the mouth has been thoroughly brushed after the meal there will be no food debris. So with thorough brushing the progress of the plaque formation is controlled. In a mouth which has been inefficiently cleaned after meals some plaque remains and a between-meal snack can fortify the carbohydrate supply in the plaque. Recently it has been shown that in a well-established plaque acid production rises rapidly soon after a fresh supply of carbohydrate and so within half-an-hour of eating highly refined carbohydrates, acid production is near its peak. In terms of time, carious destruction in the early lesions is taking place very soon after meals and decreases steadily thereafter until the next intake of sugar. It is just as important to clean the teeth after the mid-morning coffee and chocolate biscuit as it is after breakfast or lunch. If this is not possible teeth can be cleaned successfully by chewing fibrous fruits or vegetables such as apples, carrots or turnips. 'When you cannot brush your teeth, chew an apple' is a worthy slogan.

If the foregoing is correct why has success not been achieved before this? Toothbrushes and tooth powder have been made for several hundreds of years. Yet the caries rate rises. The answer is that most toothbrushing is inefficiently done. More and more attention is being given to instruction in the correct method of toothbrushing and many pamphlets are available for patients. It is regarded as part of a dental surgeon's practice to instruct his patients in toothbrushing and oral hygiene. When carrots, turnips or

apples are used to clean the teeth the emphasis must be on chewing and pulverizing them thoroughly before swallowing.

Finally, can anything be done to fortify the enamel against the acids? It has always appealed to the logical mind that if the tooth was perfectly formed and in correct alignment with the other teeth it ought to resist decay. Microscope studies of teeth show clearly that if teeth are well formed the enamel prisms are compact and solid and the dentine regular. In teeth from undernourished children the enamel is quite different: it is irregularly formed, there are obvious defects and the dentine has spaces and irregularities. Despite this histological evidence it has always been difficult to establish proof that poorly calcified teeth are more likely to decay. In fact there is quite a strong feeling held by some clinicians that these teeth are less likely to decay than normal ones but proof of this is also lacking. The fortification of the diet with vitamins and minerals is sound nutrition but there are few cases of malnutrition now and yet caries is still rampant.

What advice can a general practitioner give his patients? When possible reduce sugars and highly refined carbohydrate items from the diet. If sweets are desired have them at the end of the meal. Eliminate eating between meals. When food has been taken try to finish with some fibrous food which requires chewing: e.g. apple, carrot, celery. Whenever possible, brush the teeth thoroughly after each meal especially after sweets have been taken. If milk and biscuit is taken at supper, it must be followed by toothbrushing. No food must be taken after the teeth have been brushed last thing at night before going to bed. When carbohydrates are consumed even in moderate quantities patients should visit their dentist every six months for the etiological factors of caries are present in the mouth.

FLUORIDES

Recently a new development has occurred. This is the importance of sodium fluoride in the formation of enamel. The calcium in enamel is in the form of calcium hydroxy apatite. In a liberal supply of fluoride it becomes calcium fluor apatite. This salt is much less soluble in acids and this is one explanation for the fact that where the drinking water contains one part per million (1 p.p.m.) of sodium fluoride the caries incidence in the children is much lower than in areas where the fluoride is less. Sodium fluoride is being deliberately added to some public water supplies so that it reaches the taps in the homes in a concentration of one part per million. This addition has aroused opposition but evidence from North America and from this country shows that where it happens, naturally or deliberately, the community do not suffer from fluorosis and their children's caries incidence is low. Sodium fluoride and more recently stannous fluoride have been applied to the surface of the tooth with beneficial effects, but this method requires a trained dentist or hygienist. In an endeavour to overcome the necessity of skilled application stannous fluoride has been added to toothpaste.

The exact mechanism of the protection by fluoride is not absolutely known but the less soluble calcium salt theory seems to be correct. An alternative is that the fluoride acts as an enzyme poison and prevents the production of acid from the carbohydrate by interrupting one or more of the stages dependent upon enzymes which have been neutralized by the fluoride. Enzyme poisons incorporated in chewing gum also have been suggested as a means of control of the acid production in the plaque.

SPECIAL CASES

In all practices there are patients for whom special dental care is most desirable. If extractions are indicated post-extraction bleeding can be a problem. Hæmophiliacs and patients on anticoagulant drugs are examples in this group. It is essential that known hæmophiliacs or those suffering from allied bleeding diatheses should receive regular dental supervision every four months. They should have a low-carbohydrate diet and pay great attention to their toothbrushing. The low carbohydrate diet is often a problem with these children as they frequently spend weeks in hospital from infancy. Well-meaning relatives and friends give them sweet tit-bits and to break them of this habit is often difficult and thought to be heartless. Sweets should then be taken at the end of a meal followed by a portion of apple and then toothbrushing. Patients on anticoagulants are usually middle-aged and perhaps edentulous. If teeth are present they should be advised to get a regular check on their condition. If extractions are indicated it is important to do this deliberately at a selected time with the usual pre-extraction precautions about cutting down the drug rather than have to extract the tooth or teeth in a hurry because of a dental abscess or severe pain.

Dental caries can present a problem to those treating patients with heart disease. In these patients extractions present a problem—because of the possibility of post-extraction bacteriæmia from apical abscesses or pyorrhœa. Circulating bacteria might land on a damaged heart valve or in a cardiac defect and establish themselves, giving rise to subacute bacterial endocarditis. Antibiotics do help but prevention is better than cure. Patients with congenital or acquired heart disease ought to be seen regularly by their dentist so that sepsis does not arise around the teeth.

Diabetics and patients with other endocrine disorders are often difficult problems and usually require admission to hospital for dental extractions. It is important that diabetics should be examined regularly by their dental surgeon as there is a tendency for gum disease to be present and it is difficult to control unless adequately supervised.

CONCLUSION

The control of dental disease is a possibility but at the moment it appears to be extending rather than coming under control. When patients realize the value of their teeth and start to enjoy chewing well-cooked food then they will start to preserve their teeth and realize that dental treatment is not entirely restricted to the use of forceps and the construction of dentures.

THE PREVENTION AND TREATMENT OF 'PYORRHŒA'

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Any attempt to present the clinical problems of the dental profession to the medical profession will inevitably help to produce closer links between the two healing professions, daily becoming more united both clinically and academically. The liaison will undoubtedly benefit patients. *The Practitioner* is therefore to be congratulated upon the purpose of this symposium.

Although the term, pyorrhœa, has been obsolete among dentists for approximately twenty years, pyorrhœa alveolaris, defined as any generalized inflammatory condition of the gums associated with a discharge of pus from the margin of the tooth sockets, is still a descriptive, if loose, term to describe numerous conditions of gingivæ, pericemental membranes and alveolar bone, with a wide etiology, age-grouping and consequent variation in treatment. It will not therefore be attempted in this article to give a scientific classification of these conditions: knowledge which is perhaps better left to dentists who are intimately associated daily with the differential diagnosis, prevention and treatment of these conditions. Since it was first described in 1876 by J. M. Riggs of Connecticut, and known as Riggs' disease, our knowledge of the many aspects of pyorrhœa alveolaris has advanced rapidly, especially in the last decade.

Recent research has shown clearly that treatment of gingival conditions is less strictly a dental prerogative and necessitates ever-increasing cooperation from the medical profession. Certain pathological conditions of the gums may be seen first by the family doctor while investigating wider systemic conditions and medical cooperation may be required by the family dentist when hormonal implications arise and when certain prescribing and consequent control are necessary.

ETIOLOGY

It is still true that any conditions which lower the vital resistance of the body, particularly those which reduce the nutriment of the peripheral tissues, such as the infective diseases, diabetes mellitus, rheumatism, gout, scurvy, tuberculosis and syphilis, may act as predisposing causes of pathological conditions of the gingivæ and supporting tissues of the teeth. Psychosomatic disturbances may also predispose, notably in the female from puberty to menopause, to cyclic pathological conditions of the gums, calling for cooperative treatment between the family doctor and dentist. In children retention of the infantile swallowing pattern, malocclusion and mouth-breathing, whether or not due to enlarged tonsils or adenoids, are common predisposing causes of unhealthy gums.

The most common exciting causes are accumulations of tartar, lack of oral hygiene in general, benign tumours of the gums, puberty and pregnancy, although the latter two tend to produce transient gingival conditions. On the contrary, many young patients and those within the early middle-age group with sound oral hygiene habits can be attacked by mild or severe forms of 'pyorrhœa alveolaris', to use the old terminology. Asiatic Indians, from the original home of blood mutation B, are particularly prone to early loss of caries-free teeth due to unhealthy gingivæ and loss of alveolar support. This does not mean that, in this country, patients of group B are more prone than those of other blood mutations to gum diseases, for indeed such does not appear to be the case. On the contrary incomers from other more primitive areas, which fathered group O, and who are used to a coarse primitive diet are liable to develop severe pathological conditions of the gingivæ and pericementum soon after settling in 'civilized' countries and acquiring Western habits of sloppy, over-refined diet. Consequently, soft diet and absence of gingival and pericemental stimulation by firm mastication can be regarded as both predisposing and exciting causes of gum disease. Correction and guidance on dietetic habits can often be undertaken by the family doctor, if and when he can find any free time to advise on purely prophylactic measures.

PERSISTENT INFANTILE SWALLOW

Reference will often be found in dental reports to persistence of the infantile swallow, first described by Rix in 1946, and to its injurious effects upon the occlusion of the teeth and ultimately to the health of the gums. Orthodontists are divided over the ill effects of this physiological action and argue that, in any case, neither doctor nor dentist can prevent it. Owing to its clinical similarity with mouth-breathing resulting from enlarged tonsils, however, it is deemed worthy of mention.

Rix contends that, when a child's deciduous teeth have erupted, the act of deglutition should alter from the soft 'milk swallow', often with the lips apart, to a firm swallow with the teeth occluded and the lips firmly closed. He claims that persistence of the infantile swallow will tend to produce malocclusion of the teeth and unhealthy gingivæ, similar to that produced by mouth-breathing, whether or not enlarged tonsils and/or adenoids are present. The mouth-breather's retracted lips will produce a horizontal line along the upper gums where a strip of gum is exposed with the teeth. This exposed gum, lacking the protection and massage of firm lips, will become œdematous and will produce a chronic spongy condition of the gums around the necks of the teeth, and gingival pockets between the teeth. Chronic lodgement of food debris within these pockets will slowly destroy the pericemental membrane attaching the teeth to their sockets and a chronic intractable form of 'pyorrhœa' will result.

Parents may or may not—more often not—pay attention to prophylactic advice given by the family dentist, until severe damage is obvious in the

gums or irregularities of the dental arches become noticeable. Fortunately in most of Britain instruction from the family doctor is more binding upon patients and parents than the combined dictates of the six hundred-odd politicians who bicker constantly in the shade of Big Ben. The dental profession has lost the support of the politicians with the advent of the Health Act; dentists make their plea to their overworked medical colleagues for support in maintaining the prophylactic measures of closed lips and nasal breathing.

MALOCCLUSION

Irregular teeth may ultimately produce unhealthy gums. Irregularities may extend from a single misplaced tooth, due perhaps to the over-retention of a deciduous tooth or to the presence of an extra tooth (supernumerary or supplemental), to the complete malrelationship of the upper and lower dental arches. Malocclusion may result in the impaction of food between teeth or to pounding of opposing teeth against the side of a mal-placed tooth, thus destroying the pericemental membrane, a process known as traumatic occlusion. Although the destruction caused by traumatic occlusion may begin as a localized condition, if untreated it will spread to the supporting tissues of adjacent teeth. It is therefore extremely important that children be taken to a dentist immediately malocclusion of the arches or mal-placed teeth are noticed. Parents often delay such visits on the mistaken assumption that 'they will straighten themselves when the other permanent teeth erupt'. Whilst this may be true in a minute percentage of specific irregularities, only the dentist can decide and he should be presented with the problem as soon as possible. Treatment is then simpler in the majority of cases and parental squabbles of the 'You said and I said' variety are avoided. The family doctor's insistence on an immediate consultation with the dentist can safeguard teeth, gums and domestic harmony.

One particular variety of malocclusion, known as 'anterior open bite', may on rare occasions be due to arrested development of the premaxilla, an accompaniment of parathyroid deficiency. It is generally due to tongue thrusting or to thumb-sucking persisting too long. The family doctor can do much to support the dentist in correcting these habits which will eventually harm the tissues supporting the teeth.

PUBERTY TUMOUR AND PREGNANCY GINGIVITIS

Medical practitioners are familiar with these small vascular tumours on the gums of adolescent girls and expectant mothers, which differ in name and age-group only; the synonym for a puberty tumour in the dental profession is hormonal tumour (fig. 1). Treatment must be shared by the two professions: hormonal and general treatment by the medical profession and thorough removal of all tartar, excision of the growth and polishing of the teeth by the dentist, in order to remove any local irritation which might be responsible for a recurrence. Hormonal tumours appear as enlarged interdental papillæ: i.e. the V-shaped area of gum projecting occlusally between

adjacent teeth. They resemble fibrous and myeloid epulidæ in morphology, but are redder in colour. If neglected they may increase rapidly in size and produce a generalized hyperæmia of the gingivæ, leading ultimately to 'pyorrhœa'. Being highly vascular they are of rapid growth, but due to their lack of density they do not displace adjacent teeth. They are not painful but bleed easily; on the contrary when they become large enough to interfere with occlusion they may become painful and will ooze constantly.

(a)

(b)

FIG. 1a.—Case of gingivitis associated with cyclic severity during menstruation.

FIG. 1b.—Case shown in fig. 1 during the process of healing, following gingivectomy of upper gums.

The medical profession does not require a description of a pregnancy gingival tumour, which is clinically identical with the hormonal tumour but tends to disappear sometimes after parturition. Being highly vascular and of quick growth it does not space the adjacent teeth. Palliative treatment with astringents may be attempted, to restrict growth, but it should immediately be excised by a dentist and all subgingival calculus removed if the palatal portion interferes with mastication, thereby reducing the patient's nutrition when she requires it most.

BENIGN TUMOURS OF THE GUMS

Benign tumours have mistakenly been regarded by medical practitioners as phases of pyorrhœa, but they are localized whereas pyorrhœa is a general condition of the gums. On the other hand, the local condition may lead to the general. The commonest of these tumours are fibroid epulidæ and myeloid epulidæ; the latter are now known as peripheral osteoclastomas or

giant-celled tumours. A fibroid epulis occurs principally between the incisor, canine or premolar teeth. It is of dense slow growth, and arises from the fibrous tissue of the periosteum of the jaw or from the pericementum of a dental socket. As it displaces teeth, causes the formation of gingival pockets and destruction of alveolar bone, thus undermining teeth and gums, it should be radiographed and excised to the utmost depth of the growth

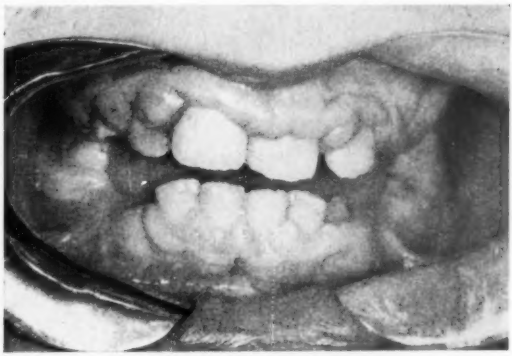

FIG. 2.—Phenytoin gingivitis.

by a dentist before it spreads from a local to a general condition. In cases of long duration it may be necessary to remove a tooth or teeth; following excision of the epulis, peridontal splints may be required to fix loosened saveable teeth.

A peripheral osteoclastoma begins in the bone between those permanent teeth which had deciduous predecessors, is purplish brown in colour and is due to proliferation of osteoclasts, the cells responsible for absorption of deciduous teeth. Osteoclastomas may occasionally occur in the same region although it has become edentulous. A central osteoclastoma arises deeper in the jaw bones in areas associated with primordial cartilage. Although neither are true giant-celled tumours, they do contain giant cells and must be thoroughly excised after careful radiographic appraisal, perhaps sacrificing adjacent teeth as osteoclastomas are liable to recur. They are regarded as locally malignant, and do not throw metastases.

Multiple gingival lesions, similar clinically and histologically, which are due to hyperparathyroidism and call for medical treatment, must not be confused with the solitary osteoclastoma. The multiple lesions are associated with lesions in other bones and are found in generalized osteitis fibroma.

PHENYTOIN HYPERTROPHY OF THE GINGIVÆ

This condition, arising usually from the use of phenytoin in the treatment of epilepsy, is becoming less frequent since other drugs have tended to be substituted for it. The teeth may be almost covered by the hypertrophied

gingivæ (fig. 2) as in diffuse gingival fibromatosis. Gingivectomy should be attempted immediately in the latter condition whereas phenytoin hypertrophy will recede considerably when the offending drug is replaced by another anticonvulsant; the gums may then respond to careful scaling and the insertion of zinc oxide gum packs by the dentist. Well-established cases will demand treatment by gingivectomy.

GINGIVITIS ASSOCIATED WITH MENSTRUATION

The work of Findlay (1959) has shown that in gingivitis of the adolescent, the hæmorrhagic engorgement of the vaginal endometrium is followed twenty-

FIG. 3.—Chronic destructive periodontitis which is the characteristic picture of 'pyorrhœa alveolaris'.

four hours later by a similar swelling of the gingival epithelium, occurring always at a fixed period in the menstrual cycle. In the course of his observations Findlay noted that the gingival condition generally disappeared with marriage (or with confessed happy promiscuity). Recurrence intervened if the marriage proved unhappy or promiscuity produced worry. There may therefore be psychosomatic involvement. Owing to the unpleasant breath associated with this common form of gingivitis it demands immediate and thorough treatment, generally by gingivectomy, but Findlay noticed that there was recurrence unless he had the cooperation of the family doctor in treatment by means of œstrogen.

CHRONIC DESTRUCTIVE PERIODONTITIS

Finally it must be emphasized that swelling or hypertrophy is definitely not an ever-present sign of 'pyorrhœa alveolaris'. Indeed, the final typical picture is often that of chronic destructive periodontitis (fig. 3).

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DENTAL PAIN AND ITS DIFFERENTIAL DIAGNOSIS

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TOOTH decay is one of the penalties of civilization, but the extraction of a tooth is a confession of failure. How great is this failure can be realized with the knowledge that by the age of twelve, 99.5 per cent. of children in this country have an average of three teeth either missing, decayed, or filled.

Far more teeth could be saved by, in the first place, an increased knowledge and awareness on the part of the public, and secondly by early diagnosis. As in all branches of medicine, an accurate history and due attention to symptoms as well as signs are of the greatest importance. The following guide is not intended to be an exhaustive academic treatise, but a rough and ready method of assessing the *probable* cause of aches and pains related to the teeth and adjoining structures. Here are a few examples.

THREE TYPICAL CASES

A patient, probably a child or a young adult, complains of sharp localized pain in a tooth on eating anything cold or sweet. The pain does not continue after removal of the cause and it is not aggravated by hot things or pressure on the tooth. Probable diagnosis: exposed dentine, i.e. the patient has a hole in the tooth which requires to be filled (fig. 1). In older patients the same symptoms and signs may arise from recession of the gums, exposing part of the neck or root of the tooth which, although not decayed, may draw the patient's attention to the fact that something is amiss. A rather typical complaint is that the drawing in of breath on a cold day gives rise to pain, or that the patient's consumption of ice cream, of which he or she is inordinately fond, has suddenly decreased because of the discomfort in eating it. Exposed necks of teeth in adults can be treated with various desensitizing agents, but as the purpose of this article is to discuss diagnosis, treatment can only be indicated in broad outline and not in detail.

To progress to our second patient, he or she complains of pain in a tooth, this pain being sharp but rather spasmodic, lasting from a few seconds to several minutes or longer, may wake the patient at night, is sometimes made worse by sweet things, but, in contradistinction to the pain of exposed dentine, where cold produces more pain, it is now heat that increases it. Pressure on the tooth does not increase the pain. Here the probable diagnosis is exposure of the pulp of the tooth due to decay and an early inflammation of the pulp. At this stage, if seen early enough, it is sometimes possible to save the tooth by means of sedative dressings after opening up the cavity, but more usually it goes on fairly quickly to the stage of acute pulpitis, which we shall imagine our third patient now to have (fig. 2).

This individual will probably state that after going through a phase like patient number two, he or she had a severe pain of excruciating intensity in the same tooth that had been niggling for some time. He or she has tried aspirin or compound codeine tablets and all the rest of it, but although

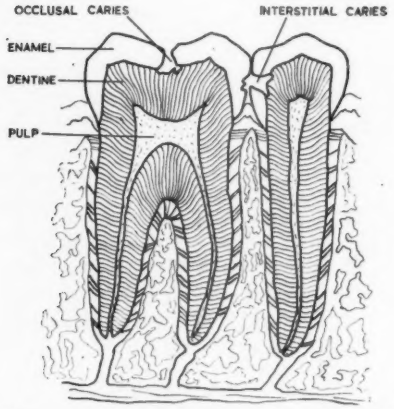


FIG. 1.—Early stage of penetration of enamel with sensitivity of dentine to cold and sweet things especially.

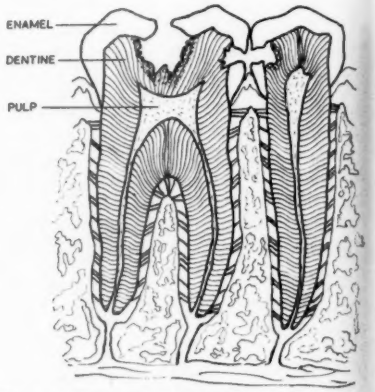


FIG. 2.—Penetration of dentine with probable inflammation of pulp leading to acute pain exacerbated by heat.

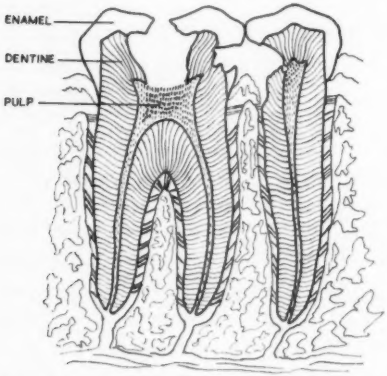


FIG. 3.—Death of pulp. Probably no pain now present but organisms advancing down pulp to apex of root leading to the condition shown in fig. 4.

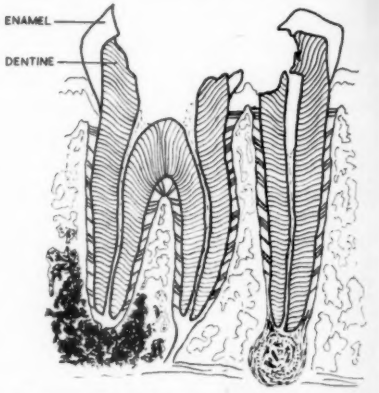


FIG. 4.—Organisms now through apex into bone causing acute or chronic abscess in bone. If acute, intense pain exacerbated by pressure on tooth.

they dulled the pain it was still intense. The stage then came when the pain seemed to radiate all over that side of the face and the patient, if seen at this stage, is no longer quite sure which tooth is involved. Cold and sweet things no longer have any effect, but the application of heat makes the pain far worse, as it increases the congestion of an already acutely inflamed pulp.

Pressure on the tooth does not have much effect, but may slightly diminish the pain if the pressure is firm, by decreasing the flow of blood into the pulp from the apical vessels. If treatment is not given at this stage, either by extracting the tooth or extirpating the pulp, the pain continues, as those who have had it will know, at a very intense level, due to the fact that pressure is quickly mounting in what, apart from the apical foramina entering the pulp, is virtually a closed box, until rather suddenly there is complete relief. This in fact spells the end of the pulp and the vitality of the tooth, as it means that the pressure within the closed box of the pulp chamber has reached such a level that the vessels entering the pulp have become strangulated and the death of the pulp tissues, including the nerve endings, has ensued. It is at this stage that patients all too often make the mistake of assuming that now the pain has gone all is well and that treatment is not required. It is of course extremely desirable that patients should seek skilled attention, even though the pain has gone, as there is probably a large carious cavity in the tooth and the organisms in the now almost certainly gangrenous pulp, if they penetrate the apex of the tooth, may cause an apical abscess (fig. 3).

FIG. 5.—Abscess that has penetrated the mandible, with considerable overlying œdema.

APICAL ABSCESS

An abscess in the bone at the apex of the tooth may, like an abscess anywhere else, be acute or chronic and may remain localized or, if barriers break down and the bone is perforated, infection may spread rapidly in the soft tissues. In the case of a small localized acute abscess, severe pain may be present, exacerbated by pressure on the tooth, and if the infection has spread into the periodontal membrane between the tooth and the bone, destroying its fibres, pus may even well up alongside the tooth. A helpful point in the differential diagnosis between this condition and acute periodontitis is that in the tooth with the apical abscess there will almost certainly be signs of decay in the crown and a story of having had trouble with the tooth or a recent filling having been done. This abscess may remain localized and become chronic, in which case the patient may complain of mild pain and discomfort in the area, particularly on pressure, and a sinus (gumboil) occasionally is seen where the pus has tracked to the

surface. X-rays are, of course, a great help in the diagnosis, once the condition has become well established, though the small acute abscess may not be revealed in the early stages (fig. 4). If the infection is more acute and tracks out from the bone, œdema of the soft tissues overlying the area is seen and pus may track into the soft tissues with the formation of an overlying abscess (fig. 5).

In the lower jaw, save for the region of the second and third molar teeth, where the pus may track inwards, the abscess usually forms on the cheek side. In the maxilla, whilst abscesses in connexion with teeth may similarly point to the buccal side, pointing on the palatal side is not infrequent (fig. 6). Perforation into the maxillary sinus, though rare, occasionally occurs. With an acute spreading abscess of this type, there is often severe malaise with rise in temperature, and swollen lymph nodes draining the area. Drainage of the abscess by removal of the offending tooth, incision of the abscess if it has reached the stage of pointing, the application of heat, and administration of antibiotics are indicated.

FIG. 6.—Abscess from apex of tooth which has penetrated the palate. The differential diagnosis is from gumma of the palate.

There has been much discussion about whether the tooth associated with an acute abscess at the apex should be extracted in the acute phase, owing to the risk of spreading the infection. This particularly applies to the lower second and third molar teeth, where there is a danger of pus tracking down deeply between the fascial planes of the neck. The old surgical adage of 'where pus is present, let it out' remains as true here, however, as anywhere else. If pus is welling up along the side of the tooth and the abscess is therefore draining, it is possible to temporize. If an abscess is pointing and can be incised, again it is possible to leave the tooth until the acute infection has subsided and take it out later. If, however, pus is forming underneath the tooth and the only way to let it out is to remove the tooth, then the tooth itself must be removed even in this acute phase.

The particular form of infection akin to an apical abscess but different in its causation is fairly often found in connexion with the erupting lower third molar tooth. Owing to the fact that the human lower jaw has been becoming smaller at a faster rate from the evolutionary point of view than the teeth themselves, in the modern European the lower third molar has little room to erupt into its correct position in the arch and is often found misplaced,

particularly tilting forward and only partially erupted. A flap of gum is left over this erupting tooth, debris and organisms are trapped underneath, and an acute infection of the soft tissues in the area results, with so-called pericoronitis. This infection may only involve the soft tissues, or may spread into the bone, giving rise to considerable œdema, and, if the pus is trapped, an abscess may result. The particular danger here is the downward spread of infection, with massive œdema of the neck simulating Ludwig's angina. Fortunately, since the advent of antibiotics, this condition is far rarer than it used to be. The remarks made earlier about the treatment of an apical abscess apply in the same way.

ACUTE PERIODONTITIS

Acute periodontitis may be traumatic in origin and can be due to sterile inflammation of the periodontal membrane stretching between the bony socket of the tooth slinging the tooth in its socket. It can flare up typically as a result of biting hard on some unexpectedly firm object, e.g. a shot in a piece of game, or can occur in a tooth or its opposite number as a result of a filling that is too high having been inserted. A history of trauma or recent filling is helpful in the diagnosis and, unlike the apical abscess, whilst there is a possibility that there are signs of decay in the tooth, it will not necessarily be present. The treatment indicated is rest, by avoiding chewing on the tooth, and, if necessary, grinding its opposite number slightly to relieve it, or, in the case of a high filling, to reduce its height.

SINUSITIS, OSTEOMYELITIS AND 'DRY SOCKET'

Before going on to conditions of the gums that may cause pain, there are one or two small points that may perhaps be worth keeping in mind. Some confusion arises at times in the differential diagnosis between an abscess on a maxillary molar tooth and *maxillary sinusitis*. A history of a recent cold, nasal discharge, or pharyngeal 'catarrh' is a helpful pointer towards sinusitis, as is the increase in the feeling of pain and tension in the area on bending down. X-rays will of course clinch the diagnosis.

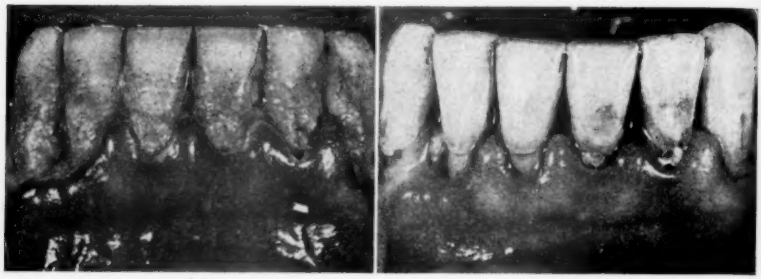
Osteomyelitis, which is extremely rare in the maxilla and only occurs in infancy, is fortunately now comparatively rare in the mandible. It is not nearly so fulminating in type as osteomyelitis of the long bones and a quite marked stage of destruction may be reached, with multiple sinus formation, without any sudden rise in temperature and other constitutional signs. Pain is usually of a mild aching character, a brawny swelling is usually present over the infected area, and sinuses may be present. Diagnosis can be confirmed by x-rays when the condition has become established.

Another trying condition, though far more minor in character but which often gives rise to an aggravating continuing ache, is the so-called *dry or septic socket* following extraction. This is in reality a localized osteitis due to infection in the socket of the extracted tooth, with consequent loss of the blood clot and exposure of the bony walls of the socket, pieces of which

are frequently exfoliated as small sequestra. Rather like the cliché applied to the common cold—that with the advance of modern treatment the time of duration has been cut from fourteen days to a fortnight—treatment, once a septic socket is present, is palliative. Hot mouthwashes are indicated, with syringing out of the socket and the insertion of small plugs of wool impregnated with anodynes such as essential oils and chloretone.

THE GUMS

Typically, gingivitis, whether mild and marginal, or deeper and more profound with loss of attachment of the tooth to the bone (pyorrhœa), does



(a) (b)

FIG. 7.—(a) Acute fuso-spirochætal gingivitis. Note pus and sloughing margins of inflamed gums. (b) Same mouth after treatment.

not usually give rise to much pain, and any pain there is is generally of a slight feeling of irritation and discomfort. Vincent's infection (trench mouth), which is an acute fuso-spirochætal gingivitis causing acute inflammation of the gums with ulceration, can give rise to severe pain, often with pyrexia, with constitutional signs and symptoms together with marked halitosis. The condition is usually fairly obvious on inspection, with the gums hyperæmic and the margins by the teeth ulcerated and sloughing with pus present (fig. 7). Treatment in the acute phase is confined to irrigation to get rid of the debris, application of astringents, and administration of antibiotics in severe cases.

THE MUCOSA

It is not within the scope of this article to go into all the oral conditions that may affect the mouth as a whole, and hence the various inflammatory conditions that may affect the tonsils, for example, will not be dealt with. Experience in dental outpatient clinics, however, makes it worth suggesting that the dental surgeon should not forget mumps in the differential diagnosis of a spreading dental abscess at the angle of the jaw, and that the doctor should not forget the abscess when provisionally diagnosing mumps.

There is one small annoying affliction of the mucosa that is perhaps worth mentioning, even if the mention recalls much frustration. This is the

so-called aphthous ulcer, occurring at intervals and in crops, both on the cheeks and sometimes on the tongue, particularly in women. Much work has been done and the whole gamut of treatment, from local antiseptics through antibiotics and vitamins and hormones to psychotherapy, has been applied. Various theories have been postulated, but the condition still remains a provoking enigma, and treatment is likely to be frustrating and disappointing.

NEOPLASMS

Cysts and neoplasms, whether benign or malignant, of the jaws and oral cavity, do not normally give rise to much pain, since they are relatively slow growing. It is unfortunate that squamous-cell carcinomas of the tongue or floor of the mouth do not give rise to more pain, since they are so often unnoticed by the patient until a comparatively late stage.

TRIGEMINAL NEURALGIA

Fortunately this dreaded condition is not common. In any suspected case it is essential that a full dental examination with x-rays should be undertaken, as only too often the suspicious paroxysmal pain turns out to be due to an unsuspected cavity in a molar tooth. Once the true condition of trigeminal neuralgia with intense paroxysmal pain and 'trigger zones' has become established, in my experience local treatment is useless. It is always tempting where a buried root or similar pathological condition is present on the affected side to buoy up hope that removal will cure the tic. Alas! I have never seen these hopes come to fruition.

Electrolytic action.—Severe sharp pain like an electric shock is occasionally found, due to dissimilar metals coming into contact. The diagnostic feature is that this pain occurs on the make and break and is usually due to an amalgam filling in the biting surface of the tooth coming into contact with a gold inlay in the opposing tooth, or part of a gold denture. Patients appear to vary considerably in their sensitivity to this type of electric shock, but in some the pain can be momentarily so severe that an early diagnosis of trigeminal neuralgia may be wrongly made. The condition is easily overcome by relieving the denture or the inlay, or substituting similar metals for dissimilar ones where they come into contact.

CONCLUSION

It is clearly impossible in an article of this length to deal fully with all the possible causes of pain within the oral cavity, and some subjects such as the problems of 'teething' have been deliberately omitted as they are being dealt with in greater detail elsewhere. Unlike many conditions, however, which happily can be diagnosed by biochemical or bacteriological test, the diagnosis and treatment of the 'toothache' still require some judgment if many teeth are not to be unnecessarily lost. I can only hope that this simple guide to the more typical signs and symptoms may help.

DENTAL SEPSIS AS A CAUSE OF DISEASE

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For many years the effects of dental sepsis have been debated, not only between physician and dentist, but among the members of the dental profession themselves. Whilst time has solved some of the problems, there are many questions still unanswered. It is necessary from time to time to reassess, in the light of newer knowledge, to what extent infection of the oral cavity may affect the health of the patient.

Dental sepsis may theoretically affect the body by entry of organisms, toxins or their breakdown products into the blood stream or lymphatics from two main sites (fig. 1): (1) the apex of the tooth, (2) the pocket of the gum around the neck of the tooth—the gingival sulcus. From such pockets infection may also pass along the mucosal surfaces, and the possible effects of this will be discussed separately as a third group.

APICAL INFECTION

The local spread of infection from a dead tooth is a well-known clinical entity and most commonly follows dental caries. If caries has progressed to the extent of exposing the pulp, the entry of organisms is a simple matter; as also is their passage through the root canal to the apex of the root and the peri-apical region. Infection thereby reaches the interior of the alveolar bone and the subsequent course varies according to the virulence of the organism, the resistance of the patient and the local cultural conditions. The lesion either becomes walled off from the rest of the body, or produces an acute or subacute infection which burrows its way to the surface of the alveolus. This causes a swelling of the soft tissues which may be either a cellulitis of the face, sometimes extending into the neck, or a more localized dental abscess. Intermediate stages between the symptomless lesion and the acute soft-tissue swelling are often seen in which one or more lymph nodes are enlarged and the temperature is mildly raised. Local extension by direct spread in the soft tissues may involve the musculature of the jaws, causing trismus. Occasionally extension of the infective process from the apex of a maxillary premolar or molar may not reach the oral surface of the alveolus but rupture into the maxillary sinus.

The symptomless tooth with a peri-apical lesion that is walled off from the rest of the body may remain quiescent for many years but following alterations in the local conditions, or the resistance of the patient, the lesion may pass through a subacute or acute episode.

The peri-apical lesion during the quiescent phase may be a granuloma, a cyst or a chronic abscess. In the infected cyst and the chronic abscess the

organisms are contained inside the abscess sac or the cyst. Kronfeld (1955) states that with a simple granuloma the bacteria live and multiply in the infected root canal of the tooth. The organisms pass through the apical foramen where they are phagocytosed by the cells of the granulation tissue; the soluble toxic products are rapidly absorbed by the lymphocytes and plasma cells. This first barrier will undoubtedly control the vast majority of peri-apical infections, so long as they are undisturbed. Teeth, however,

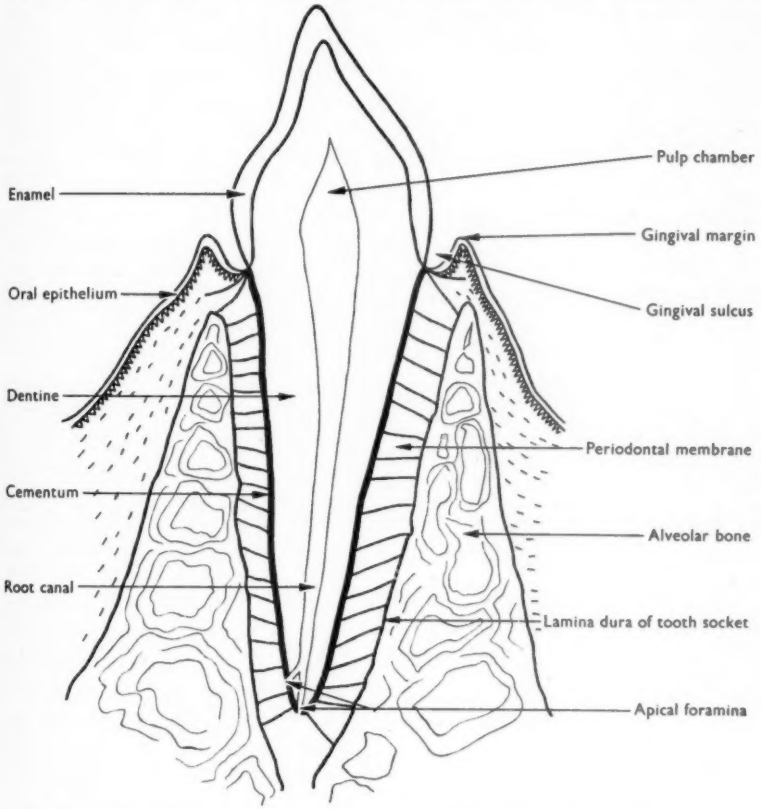

FIG. 1.—Diagrammatic representation of lower incisor tooth (not to scale).

are not rigidly fixed in their sockets and the periodontal membrane, the suspensory mechanism, normally permits a minute amount of movement.

Rushton (1953) points out that these lesions are only potentially dangerous when they are disturbed but he believes that they may be disturbed by vigorous mastication. The compression of the tooth in its socket during chewing, followed by relaxation, produces a pumping action which may admit organisms to the blood stream and more particularly to the lym-

phatics. The danger of this happening is increased if damage to the supporting tissues by trauma or disease causes abnormal mobility of the tooth. The normal removal of organisms and toxins from the blood stream will still form a second protective mechanism.

Should these two barriers fail because of a very virulent or repeatedly discharged organism or poor resistance of the patient, lymphadenitis, septicæmia, pyæmia, or endocarditis may result. Lymphadenitis should probably be regarded separately as part of the second mechanism of defence: the last lymphatic effort to deal with the infection, the failure of which will again permit organisms to reach the blood stream. The infrequency with which the peri-apical lesion causes the failure of the normal defences suggests that it is only in the presence of highly virulent organisms, or in the debilitated, that the general health is further impaired.

GINGIVAL INFECTION

The second portal of entry—by way of the gum margin—was first seriously incriminated by Okell and Elliott (1935) who showed that following the extraction of teeth 'from obviously septic mouths a transient streptococcal bacteriæmia lasting a few minutes may be observed in 75 per cent. of cases'. Their most important and unexpected finding, however, was a streptococcal bacteriæmia before operative procedures in 10.9 per cent. They also noted that 'the vast majority of endocarditis streptococci are of the salivary or *Streptococcus viridans* type'. Fish and Maclean (1936), by cauterizing the pocket of gum around the tooth before extraction, were able to show that the organisms were not entering the circulation from the apex of the tooth, but from the gingival sulcus, whilst Round, Kirkpatrick and Hails (1936) produced a bacteriæmia by giving gingivitis patients 'mint lumps to chew for ten minutes'.

These latter experiments show quite clearly that organisms enter the blood stream from the gum margin in the course of normal mastication. The ulcer of the pyorrhœal pocket of gum has a defence mechanism similar to the peri-apical lesion but, because it is exposed to the trauma of hard foods on eating, organisms and toxins may be forced into torn capillaries and through the localizing barrier. The relationship between dental infection and recurrent bacterial endocarditis, both before and after tooth extraction, has been emphasized again more recently by Dormer (1958).

For these reasons it is always important in patients with a history of rheumatic fever or other valvular disease to extract teeth under an antibiotic cover.

ALONG MUCOSAL SURFACES

Infection in the mouth may extend along the ducts of the salivary glands to produce a sialadenitis, or it may pass backwards through the oropharynx to the lungs or stomach. The passage of pus from gingival pockets, together with decomposing food debris and fragments of tartar, into the stomach may be tolerated for a time but a few patients may develop gastritis.

The inhalation of this infected material is more serious, for apart from lung abscess the exacerbation of chronic bronchitis in the patient with early heart failure is what every medical practitioner wishes to avoid. Brock (1952) has shown that, if lipiodol is inserted into the external nares or placed on the dorsum of the tongue during sleep, it can be seen on x-rays the following day in the lungs: in the axillary segment of the upper lobe or the apical segment of the lower lobe according to whether the patient is lying laterally or supine. He also shows that these are the two commonest sites of lung abscesses. In addition to this the bacteriology of these abscesses has many similarities with cultures from the infected gums. Belsey (1959) has emphasized that major surgical procedures on the lungs or œsophagus in the presence of oral infections 'will lead to a high incidence of defective healing of the bronchial stump, bronchopleural fistulæ and empyema following lung resection; following œsophageal resection and anastomosis there will be more instances of leakage from the anastomosis and severe mediastinitis'.

THE DISEASE ASPECT

Many diseases in the lists given by William Hunter and later by Sir William Wilcox have now been dismissed by both physician and dental surgeon as possible dangers of oral sepsis. A few recurring problems remain, however, prominent among which is rheumatoid arthritis. It still remains a problem because many clinicians have recorded improvement following tooth extraction. Investigation of these claims shows that in a large proportion the improvement was of a temporary nature and often coincident with each group of extractions. It is difficult to separate the psychological from the physical improvement but Rushton suggested, in 1953, that physical improvement may be related to the release of autogenous cortisone following the surgical trauma of extractions.

Iritis and iridocyclitis are two important conditions for which dental sepsis is sometimes held responsible. This is a clinical impression to support which there are many suggestive examples, though scientific proof is lacking. Some ophthalmologists and dental surgeons continue to recommend in eye conditions the treatment of potential sources of infection in the mouth, although this may be part of the philosophy that eyes are more important than teeth.

In assessing the problem of dental sepsis today, consideration must be given to whether the systemic effects may be attributed to bacteria or to toxins. The entry of organisms into the blood stream from septic teeth or gums has been shown to be a distinct and positive occurrence. The ability of blood-borne organisms to come to rest on damaged heart valves, or in the nutrient vessels of long bones, with resultant endocarditis or osteomyelitis has been recognized for longer than the possible origins of such organisms. The mucosal spread of bacteria from infected gums to the lungs or stomach must also be recognized as capable of distinct disease potentialities. On the other hand, the effect of bacterial toxins or toxic breakdown

products on the general health or on particular tissues of the patient, is much more nebulous. Some clinicians, however, do accept such a possibility, though no related toxæmia has ever been demonstrated.

Apart from gastritis, few clinicians will accept a relationship between oral sepsis and other diseases of the alimentary canal. Neither, except for a few embolic phenomena, will they accept diseases of the skin. The endocrine system has been excluded too, although it has been noted that diabetes mellitus and hyperthyroidism may be aggravated by oral infection, as they may be by infection elsewhere in the body.

REMEDIAL ACTION

Today when the physician consults the dental surgeon about a particular problem the latter will make a complete review of the infective potentialities of the gums as well as that of each individual tooth. He will investigate further all heavily filled and root-filled teeth, and after discussion with the physician decide on the best method of eliminating potential foci of infection.

The thorough scaling of tartar from the teeth and treatment of the gums will precede all considerations when the lungs or stomach are concerned either medically or surgically. The gum pockets will be eliminated by conservative means, or if necessary by the operation of gingivectomy. Only in advanced gum diseases will it be necessary to remove the affected teeth. Peri-apical infection may be dealt with by the removal of the tooth, if it is a multi-rooted tooth, or by root-filling and apicectomy if it is a single-rooted tooth. On the other hand, it is not always possible with root fillings to guarantee that one potential focus has not been exchanged for another and it may be better, dependent upon the patient's general condition, to remove such a tooth. In a patient with valvular disease of the heart, for example, the root filling of teeth is nowadays regarded as dangerous practice.

CONCLUSION

The aim of the dental surgeon must be to produce a healthy mouth and his decisions, whilst taking into account the general health of the patient, must be based primarily on the local condition. Treatment of the teeth and gums should be directed to the treatment of their own lesions, but the wholesale removal of vital caries-free and well-supported teeth carried out so often in the 'twenties and 'thirties must be labelled 'experience' and relegated to the past, where it belongs.

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POST-EXTRACTION DENTAL HÆMORRHAGE

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The peculiar feature of post-extraction hæmorrhage is the frequency with which patients seek help from their doctor and not from their dentist. A modern dental surgery has aspirating apparatus, to keep the wound clear of blood, special lights for illuminating inside the mouth and a dental chair for placing the patient in the most suitable position to receive treatment and all the surgical instruments are specially designed for use in the confined space of the mouth. Whenever possible therefore the patient should be referred to his dentist for treatment, even during the night. There are, however, occasions when an emergency arises, and the fears of a patient can be allayed with simple and immediate treatment.

Before the mechanism of blood clotting was more fully understood, the commonly practised method for arresting dental hæmorrhage, and one which is still used by many today, was to pack the socket tightly with gauze which had been impregnated with a styptic or a hæmostatic. This method had two disadvantages. It displaced blood clot from the socket, and the caustic nature of many of the drugs produced a necrosis of the tissues. These two factors, plus the superimposed infection which nearly always resulted, combined to cause pain, delayed healing and resultant loss of the alveolar ridge. Many of the difficulties and discomforts of denture wearers can be attributed to the loss of blood clot from a socket, and the subsequent infection and bone loss.

An investigation in the surgical department of the Manchester Dental Hospital has shown that 98 per cent. of all the cases of post-extraction hæmorrhage attending the department were capillary hæmorrhages, and that all of these cases were due to some local cause. Nearly all of them occurred in patients who had no previous experience of a dental hæmorrhage or of any similar hæmorrhage in any other part of the body. There were two main characteristics of most of the hæmorrhages seen. One was that nearly all of them occurred three to four hours after the teeth were extracted, and the second was the marked persistence of the blood flow, rather than its copiousness. The slowly flowing hæmorrhages which persist over a period of a few days, give rise to distress and alarm in the patient. Such cases are probably those most commonly seen by the medical practitioner, and they are the most difficult to arrest, unlike the more copiously flowing hæmorrhages which are usually easier.

Although most dental hæmorrhages arise from the capillaries, and generally from the mucous membranes, they do sometimes arise from the alveolus.

CAUSES OF DENTAL HÆMORRHAGE

Trauma is the most common cause of post-extraction hæmorrhage. The soft tissues may be torn and involve a large blood vessel, but most often the hæmorrhage is from the capillaries. This form of trauma may be so slight as not to be easily seen; less frequently it may be so gross that a major surgical repair is necessary. Fracture of the alveolar bone, with displacement, may result in partial tearing with extension of a blood vessel which under these conditions is unable to contract. A retained apical fragment of a root is another cause of persistent bleeding. Its presence may sometimes be located with a probe; it has a harder feel than bone, but a radiograph should be taken for confirmation if in doubt.

A vigorous mouth wash often starts a hæmorrhage: not only by the mechanical action of the wash, but by the movements of the cheeks and tongue. Similarly, eating or movements of the face against the pillow when asleep can cause an inadvertent disturbance of the socket. Children and occasionally adults sometimes deliberately play with the extraction wound with their tongue or fingers, and the cause in these cases can be extremely difficult to detect. This happens more commonly following local anæsthesia.

Pathological factors alone may cause hæmorrhage after a simple extraction but they are usually aggravated by some unavoidable trauma. Hyperæmia produced by an infection such as gingivitis, acute or chronic apical or parodontal abscess is a common cause. Infection of the clot and tissues of the socket may result in a secondary hæmorrhage, usually four to five days after extraction. A case of hypercementosis of the root of a tooth may result in a hæmorrhage. The blood vessels in the bony canals, in the alveolar wall of the socket, can be firmly attached to the walls of the canals, making them unable to contract efficiently. This is a condition usually encountered in older patients. There may be some ecchymosis of the cheek as well, and there is often a history of difficulty with the extraction, and of a previous similar experience.

Coagulation defects such as hæmophilia and Christmas disease and capillary diathesis such as Von Willebrand's disease cause hæmorrhage of the persistent but slow-flowing type, which is most difficult to arrest. Once such a case has been recognized all further dental surgical treatment should be performed in a hospital. Patients with anæmia may also develop an alarmingly persistent, slow-flowing hæmorrhage which may severely distress the patient. This may be due to lack of factor R. In such cases a hæmatological examination is always advisable and, when necessary, treatment for the anæmia should be given before surgery is performed. A nævus or central hæmangioma in the extraction area can cause a violent and persistent hæmorrhage. This needs immediate attention from the dentist. A general practitioner would only see such a case if a dentist sought his help in a crisis.

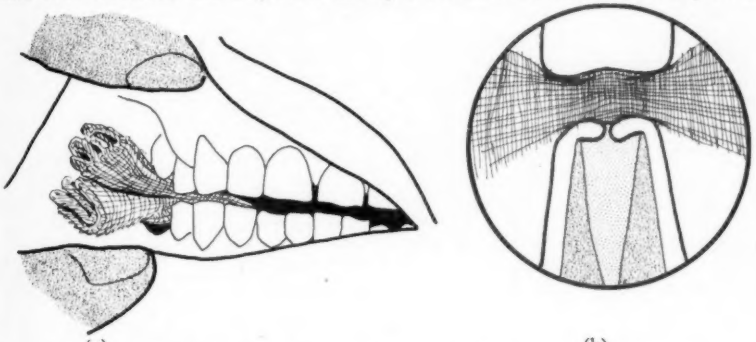
Factors associated with the anatomy are unusual. The roots of a tooth sometimes encircle a blood vessel and tear it when the tooth is removed. This usually occurs in the mandibular molar area. The apical vessels of a

tooth may be so closely connected to a main blood vessel that when the tooth is extracted the main vessel is partially and incompletely torn in such a way that the blood vessel walls are not able to contract completely. In children, when a deciduous tooth is extracted and the permanent erupting tooth is near the surface, the tissues surrounding the tooth sometimes bleed freely.

PRESSURE PAD

The simplest method of arresting a dental hæmorrhage is to use a pressure pad (fig. 1a). This method should always be tried first.

The bleeding area should be examined. The bony walls of the socket, if they have been fractured and displaced, during the extraction, should be compressed



(a) (b)

FIG. 1.—Method of arresting dental hæmorrhage by use of a pressure pad.

between the finger and thumb, into their correct position, then the mucous membranes around the margins of the socket should be approximated. A gauze pad soaked in isotonic saline or hypochlorite, and large enough to prevent the teeth from occluding when it is bitten on, is then placed across the wound. The patient is then told to bite on the pad. Pressure is in this way applied to the blood vessels of the mucous membranes, which now lie between the pad and the alveolar margins of the socket (fig. 1b). The pad is kept in place and under biting pressure for ten to twenty minutes. If the patient tires, the pressure should be maintained by a bandage placed under the chin and tied over the top of the head. He should also be sat upright in bed or in a chair.

Blood which fills the socket is not absorbed by the wet pad and a firm blood clot forms. Food debris cannot now accumulate in the socket and with ordinary hygiene infection of the clot can be prevented, while normal healing takes place.

Care should be taken to ensure that the cervical mucous membrane is not everted by the pressure pad, otherwise the bleeding blood vessel may be stretched and dilated further and the hæmorrhage made worse. After twenty minutes, if the hæmorrhage has not stopped under the pressure exerted by the pad, the socket should be sutured.

SUTURING

This is really another way of applying pressure. A suture is passed through the mucous membrane on either side of the socket and tied tightly. In this

way the mucous membrane is stretched tightly over the alveolar margins of the socket, compressing the bleeding vessels. The pressure may be increased by further sutures and by biting on a gauze pad. This is the method of choice for people who 'gag' when a pad is placed in the mouth; and it is the best method when the mucous membrane of the ridge is easily moved by the cheeks or tongue, as in parodontal disease with deep pocketing. For children who pick with their fingers or play with the socket with their tongue it is also useful. Linen or silk thread and fully curved cutting eye needles, size four, are the best. Nylon or gut is more liable to cut through mucous membrane, especially if the latter is diseased. Larger needles are more difficult to use in the mouth at the correct angle.

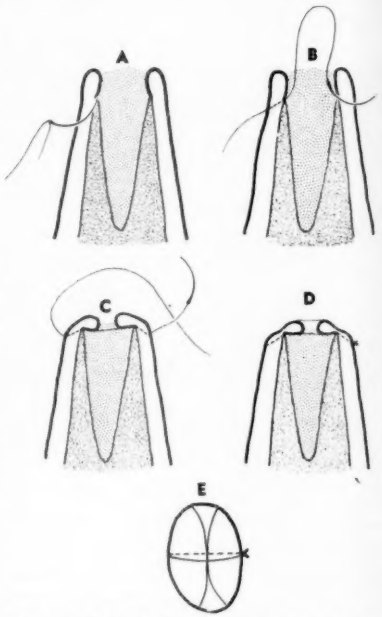


FIG. 2.—Method of suturing tooth socket to arrest dental hæmorrhage.

The needle should pierce the mucous membrane at least 2 mm. below the cervical alveolar margin of the socket (fig. 2A). In a case of parodontal disease this may be as much as 6 mm. from the free cervical margins of the mucous membrane (fig. 3A). The needle should be angulated so that it passes between the mucous membrane and the alveolar bone on the buccal or labial side of the ridge (fig. 2A, 3A). It is then carried across the socket and passed downwards between the bone and mucous membrane on the lingual side to a depth of 2 mm. from the alveolar margin (fig. 2B, 3B). When there is no pocketing this is sufficient and the suture is tensed and knotted so that the knot rests on mucous membrane on the buccal or labial surface (fig. 2D, 2E), one suture to a socket is usually enough. Where there is deep pocketing a mattress suture may be necessary to produce adequate tension (fig. 3B, 3C).

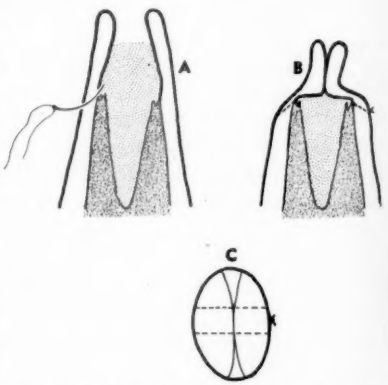


FIG. 3.—Method of suturing tooth socket to arrest dental hæmorrhage in presence of parodontal disease.

Suturing should not be used to arrest hæmorrhage in cases of coagulation defect and Von Willebrand's disease, as the puncture holes made by the needles in the mucous membrane are a further cause of bleeding.

SPLINTS

When suturing has not been successful, and for cases of Von Willebrand's disease, hæmophilia and some cases of anæmia, a splint should be constructed. Splints are of two types. The first type is made of impression composition: this is for emergency use. The second type is made of acrylic resin before the tooth is extracted. The principle involved with both types is the same: it is to apply and maintain a constant pressure over a wide area of mucous membrane around the bleeding socket (fig. 4, area B).

To make a composition splint, soften the composition in hot water and with wet fingers to prevent it sticking to them, mould the material to the rough shape required (fig. 5), place it in the mouth, again moulding it with the fingers over the wide area of mucous membrane to be compressed (fig. 5, area A). Then allow the patient to close the teeth on to the composition, until the teeth are about 1/16 of an inch (1.5 mm.) apart (fig. 6). Before the splint is satisfactory, it may have to be heated and remoulded several times. Finally chill the splint in cold water to harden.

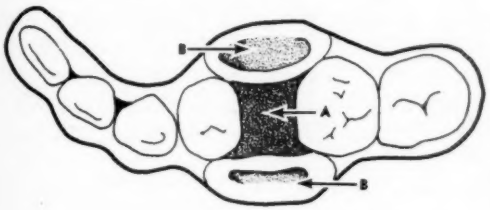


FIG. 4

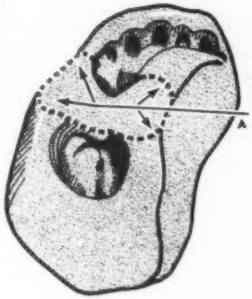


FIG. 5

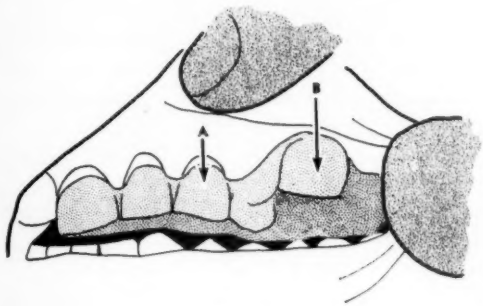


FIG. 6

FIG, 4, 5, 6.—Use of splint in arresting dental hæmorrhage.

Fig. 4.—A=socket; B=area of pressure on mucous membrane.
Fig. 5.—A=area of compression by composition splint on mucous membrane.
Fig. 6.—A=splint covering tooth; B=acrylic splint compressing mucous membrane around the socket.

The second type of splint is made preoperatively by the dentist.

Impressions of the mouth are taken and models cast. The teeth to be extracted are cut off the model and the area of mucous membrane to be compressed is scraped a little on the model (fig. 4, area B). This will effectively increase the compression of this area when the splint is made. It should also be constructed to a slightly open bite registration for the same reason (fig. 6).

Both types of splint can be worn for a long period of time, but pressure should be maintained by a bandage under the chin tied over the head.

Occasionally mucous membrane is torn off, leaving exposed bleeding

tissues. The peripheral mucous membrane of such wounds cannot be drawn together. Apart from tying of the larger vessels, gauze soaked in Whitehead's varnish should be sutured over the wound. Not only will this help to arrest the hæmorrhage, it will also prevent distortion of the area involved, such as shortening of the buccal or labial sulcus. A splint may usefully be made to support the pad to keep it in a good position. It will in this way help to maintain the normal shape of the area involved.

SECONDARY HÆMORRHAGE

Secondary hæmorrhage due to infection is a difficult type of dental bleeding to arrest. It usually occurs on the fourth or fifth day after extraction. Bleeding is usually free and the mouth dirty with a characteristically foul smell. The hæmorrhage arises from the alveolar walls of the socket, but it may also be from the surrounding mucous membranes. Suturing the socket and a compression pad will not arrest this hæmorrhage. Infected clot, pus and debris must first be removed by gently syringing the socket with warm isotonic saline.

The socket is then filled with a thick paste of zinc oxide mixed with eugenol or a piece of dequalinium cellulose sponge. The socket is then tightly sutured. In this way, together with a pad or splint, pressure can be exerted on the bleeding area. If the patient is febrile an antibiotic should be administered parenterally. Zinc oxide leaves a cavity when it is removed. The dequalinium cellulose sponge does not need to be removed and helps to form a sound ridge. Both materials are antiseptic.

This method is also useful for arresting hæmorrhage from a torn blood vessel in the socket and for bleeding in cases of hypercementosis of the root with sclerosing osteitis.

Hæmostatic drugs on gauze, such as turpentine, tannic acid, solution of ferric chloride B.P., packed into a socket always result in necrosis of the tissue followed by secondary infection. Gauze packs also displace blood clot and help by their wick action to bring infection into the socket.

Instructions to the patient are important. Hot food and drink should be avoided, but as good a meal as possible should be taken. This engages the visceral blood bed and helps to reduce local blood pressure. The patient should rest, and be propped up on pillows when in bed. Riding bicycles, running or fast walking should be avoided, strenuous work, housework, bending and lifting should be stopped.

Finally, if help or advice is needed, this can readily be obtained from the consultant dental surgeon in the hospital service.

I wish to thank Mr. Edward E. Smith and the department of medical illustration, United Manchester Hospitals, for the illustrations; also my colleague Mr. E. H. Seeley for many valuable suggestions.

DENTAL ANÆSTHESIA

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DENTAL anæsthesia—like most other forms of outpatient anæsthesia—has lagged behind the revolution which has overtaken inpatient anæsthesia during the past thirty years. To some extent this is due to the fact that ambulant patients cannot be given large doses or concentrations of the drugs involved because they are required to recover rapidly and leave for home in the shortest possible time. To provide any other type of service would involve recovery rooms attended by nurses who just do not exist. The wind of change, however, is upon us and Tom (1956), Bourne (1952, 1954, 1957, 1958, 1960) and McConnell (1959) have done great service in drawing general attention to the dangers of anoxia and the more insidious types of cardiovascular collapse which appear to be inherent in the administration of nitrous oxide.

NITROUS OXIDE

Unfortunately, nitrous oxide is a very weak anæsthetic and, for the best part of a century, it has been customary to employ varying degrees of anoxia to augment its potency.

This was carried to extremes in the 1920's (McKesson, 1926) with the introduction of 'secondary saturation'. With this technique oxygen was withheld during nitrous oxide induction until cyanosis was replaced by pallor, the pupils became widely dilated and did not react to light and respirations began to falter. At this point the lungs were inflated several times with pure oxygen and, when the 'oxygen apnœa' was replaced by spontaneous regular respiration, anæsthesia was continued with a mixture of 5 to 7 per cent. oxygen and 93 to 95 per cent. nitrous oxide. This method, originally designed to produce short periods of complete muscular relaxation, e.g. for sewing up the peritoneum during abdominal operations, was later modified to subdue resistant patients during dental anæsthesia. Although popular at the time in the United States, secondary saturation never became popular in the United Kingdom because it was thought to throw too much of a strain on the right side of the heart.

For a long time, however, adults have been induced with pure nitrous oxide until anæsthetized, in the hope of facilitating a rapid rise in the plasma concentration of nitrous oxide and, consequently, of speeding up the induction. Once anæsthesia has been established each anæsthetist has adopted his own particular technique of increasing the oxygen percentage. At one time it was customary to maintain anæsthesia on as low as 3 to 5 per cent. oxygen unless the administration lasted for more than, say, three minutes. Of course, even in the presence of what appears to be complete nose-breathing, some air is entrained through the mouth but, even so, the slight increase in the percentage of oxygen inhaled has never been sufficient to relieve cyanosis. For the past fifteen years there has been a general trend towards giving higher concentrations of oxygen. A fairly general picture of the course of a present-day nasal administration of a nitrous-oxide-oxygen mixture would be as follows:—

(a) Pure nitrous oxide is administered to an adult until general anæsthesia is established; this is recognized by:—

(i) Automatic (i.e. regular and rhythmic) respirations.

(ii) Suppression of the eyelid-reflex: i.e. the upper eyelid can be raised without causing the patient to shut the lids tightly together. After a few more breaths this sign is followed by:

(iii) Suppression of the eyelash reflex: i.e. stroking the eyelashes no longer causes blinking.

(b) With the induction now complete, anæsthesia is maintained with a mixture containing 10 per cent. of oxygen and 90 per cent. nitrous oxide.

(c) If anæsthesia continues for longer than three minutes the percentage of oxygen is gradually increased. One authority (Goldman, 1959) states that this increase should be at the rate of 1 per cent. for every further minute of anæsthesia. This would ensure inhalation of from 17 to 20 per cent. of oxygen if anæsthesia is continued for ten minutes.

(d) At any stage, marked cyanosis should be rectified by increasing the oxygen percentage.

(e) After ten minutes most anæsthetists now consider it better to use an adjuvant rather than rely on nitrous-oxide-oxygen mixtures involving the incidence of cyanosis.

With nasal administration for children it has long been the practice to induce with a mixture containing 5 to 10 per cent. of oxygen for, owing to their higher metabolic rate and the small capacity of their upper respiratory passages, small patients rapidly become cyanosed if pure nitrous oxide is given. Even blowing nitrous oxide at children (in order to avoid the frightening effect of a face-mask) often produces slight cyanosis. For maintenance, the percentages of oxygen are higher at all stages.

For some years it has been known that if all the nitrogen is eliminated from the blood plasma, higher nitrous-oxide-plasma levels can be ensured for any given percentage of the gas inhaled. Patients are usually encouraged to inhale pure oxygen for fifteen minutes to enable them to get rid of as much nitrogen as possible from the plasma. Recently, Mostert (1958) adapted this method for use in dental anæsthesia. Nitrogen 'washout' was encouraged by the inhalation of oxygen for from 2 to 2½ minutes. This, he claimed, ensured that from 80 to 90 per cent. of the plasma nitrogen was removed. He also maintained that operations lasting from two to three minutes could then be performed with a nitrous-oxide-oxygen mixture containing as much as 20 per cent. of the latter gas.

I have modified this technique for use with relatively poor-risk patients as follows:—

(a) Eight breaths of pure oxygen.
(b) Eight breaths of a 50-50 mixture of nitrous oxide and oxygen.
(c) Eight breaths with the oxygen registering 20 per cent.
(d) Eight breaths with the oxygen registering 15 per cent.
(e) The oxygen percentage kept at this level and an adjuvant added.
(f) The oxygen percentage raised to 20 per cent. as soon as possible after anæsthesia is established.

This method has the advantage of ensuring high oxygenation, some degree of nitrogen 'washout' and the psychological advantage of 'getting on with the anæsthetic', thus minimizing the frustration of the long induction period associated with prolonged administrations of pre-anæsthetic oxygen.

Klock (1955) attempted to avoid anoxia by administering a mixture containing 80 per cent. nitrous oxide and 20 per cent. oxygen for several minutes until the patient reached a stage which he christened 'amnalgesia': i.e. the patient could neither feel nor remember any pain or discomfort. In fairness it must be stated that, when this state was reached, he often injected local analgesic solutions to make assurance doubly sure—especially if he thought that the operation would take a long time.

Tom (1956) described a somewhat similar technique which he used almost entirely for children. After inducing the patient (via a face mask and full rebreathing bag) with pure nitrous oxide he changed over to the nasal administration of a mixture containing 17 per cent. oxygen and 83 per cent. nitrous oxide. Amnalgesia was said to supervene after two to three minutes. If, during the administration, the child were to become restless Tom advocated a resumption of pure nitrous oxide for four breaths and then a return to the former maintenance mixture. I have found that less initial cyanosis results if the method is modified as follows:—

(a) Four breaths of pure nitrous oxide.
(b) Four breaths of 5 per cent. oxygen and 95 per cent. nitrous oxide.
(c) Four breaths of 10 per cent. oxygen and 90 per cent. nitrous oxide.
(d) Maintain anæsthesia with a mixture of 15 per cent. oxygen and 85 per cent. nitrous oxide, gradually increasing the oxygen to 20 per cent. and adding an adjuvant if necessary.

Amnalgesia is a difficult state either to describe or to recognize but the small patient usually has an 'unseeing eye' although occasionally a 'seeing' look returns during painful stimuli, only to disappear as soon as the stimulus ceases. Desultory attempts to phonate or the establishment of a 'gas grizzle' unrelated to stimuli should be ignored. Reassuring the patient during the induction helps a great deal and quiet but imperative commands during the actual state of 'amnalgesia' undoubtedly have a good effect in keeping the patient quiet, still and 'contented'. This technique has been found utterly useless when trying to anæsthetize difficult or unmanageable children. In other words the success rate is directly proportional to the degree of patient-cooperation.

The risks associated with nitrous oxide anæsthesia are twofold. First are those due to hypoxia or frank anoxia: i.e. retching, vomiting, cardiac ischæmia, syncope, cardiac arrest and cerebral damage. Next, there is the occurrence of 'fainting'. Bourne (1954, 1957, 1958 and 1960) maintains that vago-vagal reflexes are not suppressed during nitrous oxide anæsthesia and that, in a definite proportion of patients, there may be sudden slowing of the heart and an equally sudden reduction in the peripheral vascular resistance. This mechanism is identical with the common or garden 'faint' and results in sudden pallor and lowering of blood pressure. The fact that the patient is already unconscious tends to mask the condition so that it passes unrecognized. Bourne also maintains that there is evidence of permanent cerebral damage resulting from this syndrome. After investigating a large number of patients, Goldman and his colleagues (1958) failed to

detect this type of collapse. I have seen several such cases, however, and treated them by:—

(a) Lowering of the head to the horizontal position.
(b) Intravenous administration of atropine.
(c) Intravenous administration of methylamphetamine.
(d) Raising the legs to the vertical position.

If the condition is recognized soon enough this last manœuvre results in a most dramatic recovery. The colour returns to the ashen face, the pulse suddenly quickens and the patient rapidly recovers consciousness. If unrecognized this syndrome results in a very slow return of consciousness after the anæsthetic. Any patient giving a history of lengthy recovery of this nature should be regarded as a potential victim of this condition and given intramuscular atropine before starting subsequent nitrous oxide administrations. This precaution proved most successful in one such patient who had to have repeated anæsthetics for the removal of teeth.

VINYL ETHER

Vinyl ether ('vinesthine'), given by the single-dose method, is suitable for children who only require a few teeth extracted. Until the advent of cyclopropane as a dental anæsthetic it was the most effective method of dealing with difficult or otherwise uncooperative children.

It can be given in one of two inhalers: the Goldman Inhaler (Goldman, 1936) or its 'Oxford modification' (Boston and Salt, 1940). Each essentially consists of three main parts: a face-mask, the sponge-chamber (where the vinyl ether is vaporized) and a rebreathing bag. The control at the top of the Goldman inhaler has three positions: 'fill', 'off' and 'on'. The control of the Oxford modification is slightly more elaborate as it allows several positions between 'off' and 'on'; in other words the vapour strength can gradually be increased instead of suddenly reaching full strength as in the original model. Each has a small metal funnel permanently attached which allows the anæsthetic liquid to be poured into the sponge chamber when the control is set at 'fill'. Movement to the 'off' position traps the charge until required.

For convenience ampoules of vinyl ether are marketed in two sizes: 5 ml. and 3 ml.: the former for adults and the latter for children. This method, however, has never become popular for anæsthetizing adults.

To anæsthetize, the face-mask is brought near to the small patient who is then instructed to 'blow in and out'. After timing the rate of breathing it is an easy matter for the anæsthetist to press home the mask just at the start of an expiration—thus filling the rebreathing bag. From now on the mask must be held firmly on the patient's face to avoid losing the air in the bag and the control is advanced (gradually in the modified model) until all the respirations are passing through the sponge-chamber. Adequate anæsthesia will be demonstrated by the advent of automatic respiration, by which time there will also be adequate relaxation of the masseteric muscles. The surgeon usually has from sixty to ninety seconds in which to operate but longer operating time can be made possible by substituting nasal nitrous oxide and oxygen directly the vinyl ether inhaler is removed.

Considerable salivation occurs when using this method but liquid is easily prevented from being inhaled by flexing the head forward during the induction so that the saliva can drain out into the lower part of the face mask. Some anæsthetists like to fill the reservoir bag with a 50-50 mixture of oxygen and nitrous oxide instead of inflating it with the patient's own breath.

As a supplement to nitrous oxide and oxygen, vinyl ether can be added by inserting the Goldman drip-feed vaporizer in the circuit between the anæsthetic apparatus and the delivery tubing.

TRICHLORETHYLENE

Trichlorethylene ('trilene') in doses of 1.5 ml. (Galley, 1943, 1944, 1945) can be substituted for vinyl ether in the Goldman inhaler or its Oxford modification. The induction with either anæsthetic is identical except that trichlorethylene, being slightly the less pungent, causes rather less breath-holding. As with all other methods of administering trichlorethylene care must be taken to avoid rapid, shallow respirations which, however, only occur if the concentration is pushed too high. This type of breathing (tachypnœa) prevents adequate oxygenation of the lungs and consequent hypoxia of the patient. It was first described by Lehmann (1911) who reported respiratory rates of anything up to 100 per minute during experiments on cats. It was first observed in man by Striker and his colleagues (1935) and later by Hewer and Hadfield (1941), as well as Haworth and Duff (1943) and Waters and his colleagues (1943). These fast shallow respirations of trichlorethylene have been explained physiologically by Whitteridge and Bülbring (1944, 1946), who investigated the effects of various anæsthetics on the pulmonary nerve endings associated with the Hering-Breuer reflex. Respirations of this type, however, are unlikely to occur during dental anæsthesia—particularly when using the single-dose technique.

As a supplement to nitrous oxide and oxygen anæsthesia Galley (1944, 1945) suggested that trichlorethylene should be placed in a Rowbotham chloroform vaporizer attached to a Walton or McKesson apparatus. It can now, of course, be used in a Goldman halothane vaporizer provided the control is changed for one labelled 'trilene'. If used in sufficiently low concentrations tachypnœa is most unlikely to occur and any respiratory rate lower than 30 per minute is well on the safe side. In order to permit very low concentrations of trichlorethylene to be used Boston (1956) described an apparatus incorporating a redesigned Rowbotham vaporizer. Even with the low concentrations thus made possible Boston found that he and his colleagues obtained a remarkable reinforcement of nitrous-oxide-oxygen anæsthesia in the dental chair.

CYCLOPROPANE

As already mentioned, Bourne (1952, 1954, 1957, 1958, 1960) has drawn attention to the dangers associated with the conventional forms of nitrous oxide administration; not only the obvious danger of hypoxia but the more insidious complication of 'fainting' under anæsthesia (Bourne, 1958). In an effort to provide the occasional anæsthetist with a safe, simple and portable method for the administration of dental anæsthesia he suggested the use of a 50-50 mixture of cyclopropane and oxygen. The patient breathes to and fro into a reservoir-bag containing this mixture without any provision for carbon-dioxide absorption. There are three disadvantages to this technique. First there is the obvious lack of operating time although, in this respect, cyclopropane offers an advantage over other single-dose administrations of vinyl ether or trichlorethylene. Then there is the small but definite incidence

of postoperative nausea or vomiting, although this can be minimized by placing a linguet of hyoscine under the patient's tongue half-an-hour before the administration. Lastly, there is the danger of explosion.

The probable period of operating time which will follow various induction periods with this 50-50 mixture of cyclopropane and oxygen is as follows:—

Induction time	*Operating time*
20 seconds	40 seconds
30 seconds	55 seconds
40 seconds	70 seconds
50 seconds	90 to 100 seconds
55 seconds	120 to 140 seconds
60 to 70 seconds	150 to 190 seconds

From this it will be seen that the conventions associated with nitrous oxide administration are completely reversed. Instead of lengthy inductions being followed by a relatively short operating period, with cyclopropane we have short inductions followed by surprisingly long recovery periods during most of which the surgeon can operate.

In order to find a solution of the explosion problem Bourne and Morton (1955) performed a large number of experiments which resulted in a new mixture being advocated: cyclopropane 50 per cent., nitrogen 25 per cent. and oxygen 25 per cent., this mixture being one which would neither ignite nor explode when subjected to sparks from static sources or from forceps slipping from dry teeth. About the same time Hingson (1954) was experimenting with similar mixtures for a small portable apparatus which he had designed for outpatient and 'office' surgery, finally settling on a mixture of cyclopropane 40 per cent., helium 30 per cent. and oxygen 30 per cent. This decrease in the cyclopropane concentration with an increase in the oxygen concentration has the advantage that, even in unskilled hands, the administration would have to be very prolonged before oxygen lack could occur and that it makes an overdose of cyclopropane impossible even with small patients. This information prompted Bourne to change his mixture to cyclopropane 40 per cent., nitrogen 30 per cent. and oxygen 30 per cent. Bourne has finally invented an ingenious piece of apparatus which uses miniature cylinders of the 'sparklet' type—one containing oxygen and nitrogen and the other cyclopropane and nitrogen. By screwing up the 'breech' of this apparatus the soft-metal seal of each cylinder is pierced and the reservoir-bag charged with the desired mixture.

As no patient has yet survived consciousness after three breaths of this mixture it is the obvious choice for the induction of difficult or unmanageable children. Unfortunately, the apparatus designed by Bourne is not easy to come by and, even so, the cost of the small cylinders will always make the method rather expensive. To remedy this, metering devices have been designed and are being made at two centres for the purpose of dispensing cyclopropane mixtures.

At the department of anæsthetics, Cardiff University (Mushin, 1961), large-sized cylinders of cyclopropane, nitrogen and oxygen are being used. At King's College

Hospital School of Dental Surgery, I have designed a similar machine which aims to derive its nitrogen from the air. Oxygen-enriched air and cyclopropane will be mixed in appropriate proportions so that, by connecting the reservoir bag of the inhaler to a press-button tap, a charge of the requisite mixture can be obtained with the minimum of trouble and expense.

A dispensing device of this kind, however, prevents any such apparatus from being portable and makes it mainly suitable for work in dental clinics. In the interests of economy it is hoped that one or both of the departments concerned will be successful in their efforts.

INTRAVENOUS ANÆSTHESIA

Thiopentone.—Taken by and large, the use of intravenous thiopentone in the dental chair is now restricted to an induction dose of from 200 to 300 mg. in a 25 per cent. solution (8 to 12 ml.). As often as not, one of 100 to 150 mg. (4 to 6 ml.) is sufficient and, indeed, should not be exceeded in frail or unfit patients. Thiopentone should be injected slowly in order to minimize the incidence of apnœa or hypotension. Once the patient is unconscious an assistant should start a nasal administration of nitrous oxide and oxygen, the concentration of the latter being at least 20 per cent. If the thiopentone has been given because the patient is already known to be resistant or unmanageable during anæsthesia it is best to supplement the nasal inhalation straight away with vinyl ether, trichlorethylene or halothane—preferably the last. Supplementary doses of 50 mg. of thiopentone may still have to be given in these cases at five-minute intervals for the difficult anæsthetic patient is often equally difficult from the point of view of the surgeon, and anæsthesia may be required for some time.

Methohexitone.—Recently, the search for an anæsthetic agent with a more rapid recovery rate than thiopentone has centred around the new barbiturate, methohexitone (Stoelting, 1957; Wyant and Chang, 1959; Taylor and Stoelting, 1960; Wyant and Barr, 1960) and a great deal of critical investigation into its clinical application has been undertaken (Dundee, 1956; Dundee and Riding, 1960; Dundee, Barron and King, 1960; Dundee and Moore, 1960, 1961; Moore and Dundee, 1961). Methohexitone ('brietal') is supplied in vials containing 500 mg. as a readily dissolving powder: dilution with water, 50 ml., produces a one per cent. solution. Induction of anæsthesia is effected with 5 to 7 ml. (50 to 70 mg.) of this solution. Larger doses should be avoided because of the dangers of apnœa which is not easy to control in the dental chair because of changing over to a face mask and the fact that the reservoir-bag may be at arm's length from the anæsthetist. As in the case of thiopentone, the induction may be followed by the nasal administration of nitrous oxide and oxygen with or without an adjuvant as necessity dictates.

Methohexitone solutions are stable for a long time (up to five weeks) and this drug is therefore most useful in the management of the unexpectedly difficult patient who starts to struggle during nitrous oxide anæsthesia, even when this is supplemented by powerful agents such as halothane. It is

convenient to keep a sterile solution handy from which 50 to 70 mg. can be withdrawn and injected intravenously into the back of the patient's hand. The hand is most useful as it is more easily kept still in a moving patient than the antecubital fossa. This manœuvre invariably leads to a complete subsidence of movement and quiet anæsthesia supervenes. If anæsthesia lasts more than ten minutes it is probable that doses of 25 mg. of methohexitone will be necessary at five-minute intervals. Again, this is a technique which is more likely to be associated with work in a dental clinic.

PRECAUTIONS BEFORE ANÆSTHESIA

The precautions which should be taken before anæsthesia are as follows:—

(a) The stomach should be empty.
(b) The bladder should be empty.
(c) The rectum should preferably be empty.
(d) The patient's cardiovascular and respiratory system should be adequate to withstand the strain of anæsthesia.
(e) Apparatus and drugs associated with resuscitation should have been checked: e.g. suction apparatus; apparatus for inflating the lungs with oxygen; the oxygen supply; laryngoscope, endotracheal tubes and their connexions; tracheotomy set; cardiac cutting-down set and its associated drugs; vasopressor and analeptic drugs and the mechanism which allows the dental-chair to be lowered to the horizontal position.
(f) 'Gas' supplies to the anæsthetic machine should be checked.
(g) There should be nothing tight around the patient's neck or waist.
(h) A second person should be present to act as a chaperon during the administration (this will probably be the surgeon—it is advisable to have at least one other woman present if the patient is a female).
(i) Written consent should be obtained from the patient that he (or she) agrees to have a general anæsthetic; in the case of a minor, consent in writing should be obtained from a parent or guardian.

PREMEDICATION

Premedication for dental patients is a matter of some difficulty. If adequate doses are given the patient may be sleepy and unmanageable and require a great deal more attention than usual during recovery which may well be delayed. To be effective, premedication for patients attending morning clinics should be taken before leaving home. This is rarely prescribed for fear of endangering the patient's journey to the dental surgery. A good night's rest before an operation often makes the anæsthetic much less of an ordeal. A suitable nocturnal sedative is meprobamate:—

Adults	600 to 800 mg.
Children between 6 and 9	100 to 200 mg.
Children over 9 and below 14	200 to 300 mg.

The day of the operation presents other problems. Barbiturates are useless unless given in full doses and these will almost certainly send small patients to sleep. This has obvious disadvantages.

The two methylpentynols (Galley and Trotter, 1958) have a limited use. Doughty (1959) has reassessed methylpentynol itself and recommends doses of 4 ml. of the 'elixir of oblivon' per 14 pounds (0.6 ml. per kg.) body weight. Tablets of methylpentynol carbamate can be given to adults in doses of 100 mg. per 14 pounds (15.5 mg. per kg.) body weight and are more effective

if accompanied by tablets of hyoscine placed beneath the tongue (Galley and Trotter, 1958).

Perhaps the most satisfactory premedication for young children is trimeprazine tartrate ('vallergan'). It is made up in a pleasantly tasting syrup 'vallergan forte' which contains 6 mg. of the drug per millilitre. The dose is 1 mg. per 14 pounds (0.15 mg. per kg.) body weight.

Most of these should be given at least an hour before the time of operation. Tablets of methylpentynol carbamate, however, have to be given at least seventy-five minutes before.

PRECAUTIONS

During anæsthesia.—The main preoccupation of the anæsthetist during anæsthesia is to see that adequate oxygenation is maintained and that there is at all times an adequate airway. Throat packs and lowering of the mandible by the surgeon during extractions of lower teeth are the main causes of a poor airway. Throat packs are an absolute necessity in order to prevent blood, irrigating fluids or teeth from being inhaled. For the rest, the anæsthetist must keep a constant watch for any deterioration in the patient's condition and take remedial action immediately.

After anæsthesia.—During recovery the patient's head should be flexed sufficiently forward to prevent blood trickling back towards the larynx where it might cause laryngeal spasm or be inhaled. A bowl or kidney-dish should be held below the chin to catch any blood coming from the mouth. Directly consciousness returns the patient should quietly be instructed to spit any blood present into the dish. If he feels nauseated it often helps to instruct him to take a few deep breaths. Actual vomitus, of course, can be caught in the dish already mentioned.

Most patients recover quite rapidly if minimal doses of the various drugs have been given although the recovery is delayed by the use of adjuvants and after lengthy administration. If the patient is not able to walk away (with a minimum of help) within three minutes it is preferable to have a wheelchair handy so that he can be removed from the operating room and allow the clinic to proceed. If there is any doubt about the patient's condition he should be allowed to lie down on a trolley or couch until he feels fit. Most clinics insist on a friend of the patient attending if the latter is a child or female but, actually, it would be better if all patients were so accompanied as it does decrease any danger which might occur on the way home.

Patients having received thiopentone are best kept for two hours before allowing them to go home as they may have euphoric ideas about their ability to cope with the journey. There is such a rapid recovery from methohexitone that this rule may be ignored. All patients receiving intravenous anæsthesia, however, should be accompanied by a friend. Very occasionally patients are still in a pretty shaky condition even after lying down for several hours. If the anæsthetist (or any other medical officer) thinks they are otherwise fit to leave they should return home by ambulance or private transport. No patient who has had an intravenous anæsthetic

should drive himself home, or, indeed, drive a car at all on the same day as he receives an anæsthetic.

CONCLUSION

What anæsthetists really need is a gaseous anæsthetic which is slightly more powerful than nitrous oxide but having an equally rapid recovery rate. A non-explosive ethylene would be just about right. Alternatively, we would welcome another adjuvant which had the power of halothane without its high cost or tendency to delay recovery. Methohexitone at present fulfils a real need so long as it is augmented by nitrous oxide and adequate oxygen. Here again, we would welcome an intravenous agent which was slightly more potent with even less propensity to depress respiration, but followed by an equally rapid recovery and lack of 'hangover'. Perhaps pharmaceutical manufacturers reading this plea will take these requests to heart.

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DEVELOPMENTAL ABNORMALITIES OF THE TEETH

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ALTHOUGH there are many and often elaborate classifications of developmental dental defects it is convenient from the diagnostic and clinical viewpoint to consider them as falling into two main categories.

GENERAL CONSIDERATIONS

In the first place, there are those which result from the dental formative organs not having the initial potentiality to produce teeth of normal morphology or normal composition. A proportion of these appear to be genetic in origin. Abnormalities of this type are uninfluenced in any way by the health of the affected individual as fœtus or child and there is no known therapy at present by which their extent or incidence may be influenced. They include such entities as partial anodontia, supernumerary teeth, fused teeth, invaginated teeth and the odontomes, in which a limited number of teeth may be involved, and also those defects of development of genetic origin which affect all the teeth of both dentitions, such as amelogenesis and dentinogenesis imperfecta.

The second category comprises defects of calcification or morphology which occur because the dental formative organs, which would otherwise have had the potentiality to produce normal teeth, have been exposed to some adverse circumstance. Proper calcification, for example, may have been precluded by lack of necessary factors as in enamel hypoplasia resulting from rickets. Injury to the tooth germs may also lead to the final formation of deranged or distorted teeth, whether by direct trauma as in dilaceration, or by bacterial invasion as in congenital syphilis or osteomyelitis of the maxilla. It is possible, too, for chemical components not normally present in the blood stream to be incorporated into the growing tooth during calcification, as exemplified by the brown-stained enamel of endemic fluorosis or the green-coloured teeth which have developed during jaundice. Since the cause of these conditions is known, as opposed to those in the first category, prevention is fortunately possible in certain instances.

The subject of the dental developmental defects is therefore most extensive and this short review can only be limited to a brief description of some anomalies which may be observed by medical practitioners, who may be required to give advice to patients or parents of children with one of these conditions as to its nature and consequences.

ABNORMAL PRODUCTIONS OF DENTAL FORMATIVE ORGANS OF UNKNOWN OR GENETIC ORIGIN

These include: partial anodontia, fusion of teeth, supernumerary teeth and supernumerary elements, invaginated teeth, odontomes, amelogenesis imperfecta and dentinogenesis imperfecta.

PARTIAL ANODONTIA

Developmental absence of individual teeth occurs more often in the permanent dentition than in the deciduous, the teeth likely to be missing being, in order of frequency, the upper lateral incisors, the second premolars, the third molars and the lower incisors. Less commonly any other teeth may fail to form, but the total absence of teeth is very rare.

There is, however, a 'half-way house' between the normal formation of a tooth and its complete absence, which is the formation of a tooth with a conical form of crown. A person may therefore have one absent lateral incisor whilst the other is present but conical, and it is usual when many teeth are absent for those present to be of conical form (fig. 1). There is often a family history of this tendency to suppression in the formation of individual teeth and if a mother has absent or conical lateral incisors her child may show a similar condition. Usually the lack of a few individual teeth or their replacement by conical forms is not associated with any other developmental defect, but extensive partial anodontia may be associated with an ectodermal dysplasia in which skin, hair or nails may be affected, and also with other general developmental defects such as mongolism or achondroplasia.

FIG. 1.—Partial anodontia in a girl aged 12, showing absence of all permanent incisors and canines with the exception of the upper central incisors. These and the retained deciduous teeth show the tendency to a conical form of crown.

Since the alveolar portions of the jaws are poorly developed in extensive partial anodontia, the lips pout and there are deep furrows between lower lip and chin and upper lip and base of nose, giving a gnome-like appearance. Dental treatment can do much to improve both the facial appearance and occlusion of the dentition through the closing of spaces by orthodontic treatment, the replacement of missing teeth by partial dentures or later by fixed bridges, and the maintenance of the height of bite by the building up of occlusal surfaces with crowns, inlays or over-lay dentures.

FUSION OF TEETH

Occasionally a tooth may develop which represents two adjacent teeth of the normal series fused together. As this aberrant formation most commonly involves the deciduous dentition, particularly in the anterior regions, it will often be observed by parents in their baby. The appearance may vary from two well-formed teeth joined at their lateral margins, to a single tooth which is wider than normal and which on close examination may be seen to incorporate vestiges of two adjacent teeth with absence of the normal tooth at one side (fig. 2). Fusion of two teeth in the deciduous dentition may be followed by a similar condition in the permanent dentition in the same situation. Radiographs taken at the age of 2 or 3 will clearly demonstrate whether the unerupted permanent teeth will be normal or not.

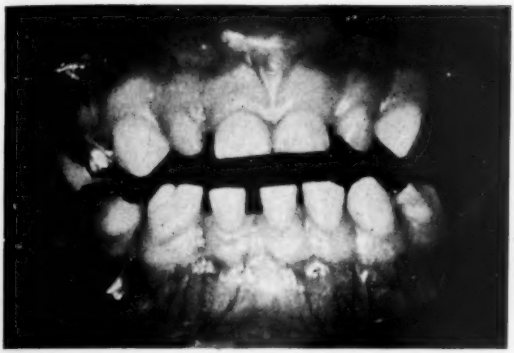


FIG. 2.—Fusion of the deciduous lower right lateral incisor and canine in a child aged 5.

SUPERNUMERARY TEETH AND SUPERNUMERARY ELEMENTS

When separate additional teeth develop they are known as supernumerary teeth, or, if they appear as well formed as teeth of the normal series in the region, as supplemental teeth. These malformations are usually part of either the deciduous or the permanent dentition and unfortunately from the appearance viewpoint they often occur in the upper incisor region.

A tooth which incorporates, or to which is fused, an additional dental element is often referred to as a geminated tooth or a dichotomy, on the assumption that it represents an attempt of the tooth germ, by splitting, to form an extra tooth, although whether these anomalies should be regarded as degrees of fission or fusion remains doubtful (fig. 3). A supernumerary tooth occurring in the deciduous incisor region is often conical and frequently lies between the central incisors, causing their separation or displacement, but more important from the clinical viewpoint is the fact that such a tooth or a fused supernumerary element is often followed by a supernumerary tooth in the permanent dentition.

Supernumerary teeth and fused elements in the permanent dentition most commonly arise in relation to the palatal aspects of the incisor teeth and range from an enlarged palatal incisor cusp to a separate well-developed

tooth (fig. 4). Although a supernumerary tooth may succeed in erupting, often it not only remains buried but it may additionally prevent the eruption of an associated permanent tooth. In fact the most common cause of failure of eruption of a single permanent central incisor is not that the tooth is absent but that a supernumerary is present. These additional teeth are often not only multiple but also inverted, when their crowns may lie in close proximity to the floor of the nose.

As a general rule, any supernumerary tooth is best removed but if it is

(a)

(b)

FIG. 3.—(a) Dichotomy of the permanent left upper lateral incisor representing the fusion of a supernumerary element. A separate unerupted supernumerary tooth, shown on the radiograph (b), is present on the opposite side, lying palatal to the right central incisor.

deeply buried and lying above the apices of the normal teeth it may safely be left *in situ*. Frequently the problem presented by a supernumerary tooth is not in its surgical removal but in the protracted orthodontic treatment involved in bringing down into occlusion and satisfactory alignment the normal incisor tooth it has prevented from erupting.

INVAGINATED TEETH

In this anomaly of development, usually involving permanent upper lateral incisors, there is an infolding of the tooth germ which produces an internal cavity communicating with the mouth through a minute orifice in the crown surface (fig. 5). A tooth with this condition is known as a *dens invaginatus* and when the internal cavity is extensive, as a *dens in dente*, an old term still used although the implied concept that one tooth had developed inside another is incorrect. In many invaginated teeth the pulpal tissues die from bacterial invasion through the coronal orifice. Subsequently, if an abscess or cyst forms its cause may not be evident unless the incisor crowns are carefully examined and radiographs taken.

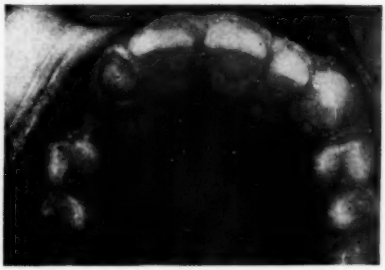
ODONTOMES

Although the term, odontome, has been employed to refer in the widest

sense to any tumour of odontogenic origin it is apparent that some varieties are frank developmental defects. A composite odontome consists of enamel, dentine cementum and pulp laid down in a grossly abnormal pattern (fig. 6). It may comprise either a mass of miniature teeth bunched together, known as the compound type, or an irregular mass of mixed calcified tissues bearing no recognizable resemblance to teeth at all, referred to as a complex composite odontome. It may also be a gestant odontome and have the form of a grossly dilated hollow calcified shell. Since these odontomes are but extreme examples of the departure from recognizable morphology often seen in invaginated and supernumerary teeth, they may similarly replace or be additional to teeth of the normal series. Odontomes seldom give clinical symptoms, being usually diagnosed only from radiographs taken to elicit the reason for a bony swelling or failure of tooth eruption.

FIG. 4.—Erupted supernumerary tooth lying against the palatal surface of the permanent upper central incisor and causing its labial displacement.

Although composite odontomes are completely benign, their surgical removal is usually indicated; subsequently, orthodontic treatment or partial denture construction may well be required to restore the appearance or function of the dentition.



(a)

(b)

FIG. 5.—*Dens in dente* of upper lateral incisor. The clinical appearance (a) is of a conical tooth with a pit in the tip of the crown, but the radiograph (b) shows a very large invagination cavity. The pulpal tissue has become necrotic and infected, the area of bone loss indicating the presence of a chronic apical abscess.

AMELOGENESIS IMPERFECTA

In the main variety of this rare condition the enamel of all teeth of both

dentitions is brown in colour, rough and very soft, giving a most distressing dental appearance. Sometimes there is no family history but generally the condition is handed down as a non-sex-linked character. In this case, half the offspring, whether boys or girls, of one affected and one unaffected parent will be likely to show the condition whilst the other half will have completely normal teeth. Those children who are affected will pass it on in the same way to their descendants, but fortunately their brothers or sisters with normal teeth cannot transmit it. Suitable cases may be treated by replacing the enamel by multiple jacket crowns.

FIG. 6.—Radiographic appearance of a complex composite odontome buried in the mandibular bone in the lower canine region.

DENTINOGENESIS IMPERFECTA

This again is usually an inherited developmental defect handed down in families in the same manner as amelogenesis imperfecta. The teeth of both dentitions have honey-brown coloured dentine and show a remarkable translucency to transmitted light. In severe cases rapid attrition occurs so that the teeth may be soon ground down to gum level. Apart from the clinical appearance the diagnosis may be confirmed by the characteristic radiographic appearances of absence of coronal pulp chambers, bulbous crowns and narrow roots. Children with osteogenesis imperfecta may show a similar dental condition.

In badly affected cases restorative treatment is often impracticable and the patient is destined to wear full dentures. There is no known treatment for expectant mother or child, such as the giving of additional calcium or vitamins, which may influence for the better the colour or degree of calcification of the teeth in either amelogenesis or dentinogenesis imperfecta.

DEFECTS OF CALCIFICATION OR MORPHOLOGY RESULTING FROM KNOWN FACTORS

These include: injury to tooth germs, hypoplasia of the enamel, dental defects of congenital syphilis, endemic fluorosis, and green teeth.

INJURY TO TOOTH GERMS

If a tooth germ is injured either by trauma or by infection during its period of calcification a discoloured or distorted tooth may result. Individual premolar or incisor teeth crowns, for example, may show brown hypoplastic areas if their germs were originally calcifying in close proximity to a chronic abscess of a dead, carious, overlying, deciduous predecessor. The extraction of a deciduous tooth may also traumatize the successor germ to an extent

that it becomes necrotic, when the calcified tissues already formed may remain in the alveolar bone as a sequestrum later to become infected. Similar sequestration of tooth germs may be seen in children who have had osteomyelitis of the maxilla. A blow in the upper incisor region of a child at the age of about 4 may apparently also cause displacement of the forming crown of a permanent central incisor, with the result that the later developing root is formed at an angle to the crown. A bent tooth of this type, known as a dilaceration, often remains unerupted.

FIG. 7.—Enamel hypoplasia in a girl aged 14. The extent of involved enamel indicates that calcification was disturbed from the time of birth to the age of 18 months. There was a history of infantile rickets during this period.

HYPOPLASIA OF THE ENAMEL

This condition is characterized by the formation on teeth of otherwise normal morphology of pitted, rough, brown-stained areas in severe cases, ranging to scarcely detectable light brown or opaque white patches on the enamel in mild hypoplasia. It appears to be caused by conditions which are active during the calcification of enamel, such as severe malnutrition, rickets, scurvy and other avitaminoses, infantile tetany or severe infections. These infections may either be acute, as in the exanthemata, or long standing as in those affecting the pulmonary system or gastro-intestinal tract. In essence therefore any systemic disturbance of sufficient magnitude may so derange the infant's metabolism that the proper laying down of enamel, and to a lesser degree dentine, cannot take place. The deciduous dentition is seldom affected since much of the enamel of each tooth is formed in the four months preceding birth, when the nutrition of the fœtus is likely to be adequate for tooth calcification.

Although postnatal deciduous enamel hypoplasia may be observed, a severe illness during the first year of life when the tooth germs are most susceptible to systemic disturbance is more likely to affect the teeth of the permanent dentition. The distribution of this type of enamel hypoplasia follows a clear-cut pattern and involves the incisal edges or occlusal surfaces of the upper central incisors, the lower central and lateral incisors, all canines and all first molars to the same extent. The upper lateral incisors may happily escape since they do not begin to calcify until the age of about 18 months. The first and second premolars and second molars also escape since the calcification of these teeth starts later still. If the systemic disorder occupied only a matter of weeks the condition will be permanently recorded on the permanent teeth as a row of pits, but if the infant suffered from some chronic condition extending over several months the appearance will be that of a broad band of discoloured and defective enamel corresponding

in width and position on the teeth crowns to its duration and age of occurrence (fig. 7).

Occasionally hypoplasia may be seen which has resulted from malnutrition or disease at a later period when perhaps the second molars and premolars will be involved whilst the incisors, canines and first molars calcified before the disorder have escaped hypoplastic defects. Many children will thus bear on their teeth for the rest of their lives, like rings in a tree, the scars of severe illnesses or severe degrees of malnutrition.

Minor degrees of enamel hypoplasia may be treated by judicious grinding but in severe cases the fitting of porcelain jacket crowns is indicated.

(a)

(b)

FIG. 8.—(a) Severe degree of fluorosis of enamel in a man of 40 who had lived as a child in a district with a high concentration (more than 5 p.p.m.) of fluorides in the water supply.
(b) Mild fluorosis in a child aged 12. The enamel shows only slight white flecking and the dentition is near caries free. Appearance caused by water fluoride concentration of 2 to 3 p.p.m.

DENTAL DEFECTS OF CONGENITAL SYPHILIS

It appears in this condition that the treponema may invade the tooth germs of the permanent teeth in the latter half of fœtal life before their calcification has begun. The resulting changes in the germs give rise to the formation of teeth of abnormal morphology in that they are smaller than normal with the sides of their crowns converging from neck to incisal edge or occlusal surface. The incisors often show a characteristic notch in the centre of the biting surface. The teeth affected are the incisors, canines and first molars. The deciduous dentition escapes since the tooth germs concerned differentiate before fœtal infection takes place.

No person need retain the dental stigma of congenital syphilis since the appearance may readily be restored by reshaping of the crowns either by grinding or by crown construction.

ENDEMIC FLUOROSIS

During the process of calcification substances not normally present in the blood stream may be incorporated into the forming enamel and dentine with an alteration of composition and possibly of appearance. If children are reared in districts where there is an unduly high content (more than

6 parts per million) of fluorides in the drinking water supply these may be incorporated into the calcifying enamel of the permanent teeth to give it a characteristic appearance. It is china-like, being dense and opaque, and brown, slightly depressed patches may be scattered irregularly over its surface (fig. 8a). In less marked cases, resulting from a lower fluoride concentration in the water (2 to 3 parts per million), the brown areas may be absent, the enamel now only showing white flecks or patches (fig. 8b).

It was as a result of the observation that children with fluorosed teeth remained relatively immune to caries that the discovery was made that if the fluoride content of drinking waters was brought up to an optimum concentration of 1 part per million the enamel still had a high resistance to carious attack although the proportion was too small to produce any alteration in normal appearance.

Severe discoloration from endemic fluorosis is best treated by removal of the enamel and replacement by porcelain jacket crowns.

GREEN TEETH

Another example of the incorporation of substances circulating in the blood stream into teeth during calcification is seen in the green discoloration of deciduous teeth occurring in children who have suffered from icterus gravis neonatorum. Bile pigments locked into the dentine at the time of calcification cannot subsequently escape and will remain visible through the overlying enamel. The later calcifying permanent teeth will be unaffected.

CONCLUSIONS

It can be seen that dental developmental defects are of interest and concern not only to the dental surgeon, whether pædodontist, orthodontist or oral surgeon, but also to the general medical practitioner, the pædiatrician and the geneticist.

Once considered mainly as museum pieces they are now properly regarded as clinical problems often requiring the most advanced restorative, orthodontic or surgical treatment procedures. No doubt in the future these in turn will give place to new methods of prevention as yet unknown.

TEETHING: NORMAL AND ABNORMAL

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TEETHING is commonly used to mean the short period when the milk teeth break through the gums. Although much legend has grown up around this process, it is not a cause of illness, and more serious trouble can arise during the eruption of a misplaced permanent third molar.

NORMAL FEATURES OF TEETHING

The process of eruption starts with the movement of the tooth from its position within the alveolus and goes on until the tooth is in occlusion with its opponent. During the process the tooth reaches the gum and this point is supposed to be the source of all the trouble associated with teething.

The whole of the crown of the unerupted tooth is covered by epithelium which is the remains of the enamel organ, and the passage of the tooth

FIG. 1.—The early stage of eruption. The incisal edge of the left lateral incisor has just emerged through the gum. The right lateral incisor is just below the surface and can be seen as a pale area in the mucosa beside the central incisor.

FIG. 2.—The moment of eruption. The tip of the canine has just appeared through the gum. In both this and figure 1, it can be seen that there is no swelling or inflammatory changes and the tooth emerges smoothly through the gum.

towards the gum is eased by the presence of epithelial rests and microscopic cysts in the intervening connective tissue. The epithelium surrounding the crown of the tooth unites with the epithelium of the gum when eruption has brought the two layers into contact. Breakdown of epithelial cells at the point of union opens the way for the tooth to enter the oral cavity (fig. 1, 2). When this has happened the epithelium covering the unerupted part of the crown can be regarded as becoming, in effect, an invagination of the gingival epithelium, which is attached to the enamel as far as the neck of the tooth. Although the tooth has to pass through the gum during eruption there is therefore no actual rupture of the gum tissues, or wound to bleed or become infected. During the further eruption of the tooth the epithelium

is in effect peeled down over the enamel but the underlying connective tissue remains completely covered.

The times at which the teeth erupt are rather widely variable and, though table I may serve as a reminder, a delay of six months or a little longer is not a cause for alarm.

THE ARRANGEMENT OF THE TEETH

The arrangement of the milk teeth after eruption is also very variable. They may be spaced or may overlap and the upper incisors may bite behind the lower (fig. 3). The lateral incisors may also erupt lingually to the centrals. None of these is usually of serious significance because the growth of the jaws (which tends incidentally to be rather irregular, with growth of the upper jaw often out of phase with the lower) usually rectifies any minor irregularities. Spacing of the teeth between 4 and 6 years as the jaws develop is also quite normal.

	Eruption	Shedding
Central incisor	6 months	7 years
Lateral incisor	9 months	8 years
First molar	14 months	10½ years
Canine	18 months	12 years
Second molar	24 months	11½ years

TABLE I.—Timetable for the deciduous dentition. The eruption times are for the lower teeth; the upper teeth are usually about 20 per cent. later.

Once the deciduous teeth are fully formed, resorption of their roots begins. This is due to giant-cells stirred into activity, mainly by the pressure of the underlying permanent teeth starting to erupt. Eventually the whole of the root and part of the crown are destroyed in this way, so that the fragment when shed is often quite hollow with a sharp edge. Resorption goes on in bursts of activity each followed by some attempt at repair by the laying down of irregular bony tissue. The result is that in the later stages the teeth are sometimes loose and at others relatively firm. The stage is sometimes reached when the tooth is still attached but tilts during eating so that its sharp edge digs painfully into the gum. The child is usually then glad to have the tooth pulled out and this is easily done with the fingers.

During the transition between the deciduous and permanent dentitions (6 to 12 years) the newly erupted permanent teeth may appear excessively large and may assume slightly abnormal positions. They may be inclined or even slightly rotated and before the eruption of the permanent canines the central incisors may be quite widely spaced. Many of these minor disorders of position of the permanent teeth also resolve themselves but it is often difficult, and sometimes impossible, to predict how they will progress. Nevertheless, it is safer not to ignore such abnormalities as, by the time adolescence is reached, a disfiguring abnormality may have developed so that the patient (especially a girl) suddenly becomes conscious of it. Treatment begun too late is often ineffective. It is wise therefore if such troubles are suspected to have the advice of an orthodontic specialist at an early

stage so that treatment (if it is needed) can be started at the most suitable time.

ABNORMAL TEETHING

Delayed eruption of the teeth.—Delayed eruption of the whole primary dentition is rare and the only important causes are the diseases in which development of the skeleton as a whole is retarded, as in rickets and cretinism. The treatment is that of the underlying disorder, after which eruption of the teeth goes on normally. The only important cause of delayed eruption of an individual milk tooth is an eruption cyst (fig. 4). This can be seen as a tense, superficial, bluish swelling of the gum. It should be widely incised with a double semilunar incision, so that the whole of the roof of the cyst is removed, to allow the tooth to erupt.

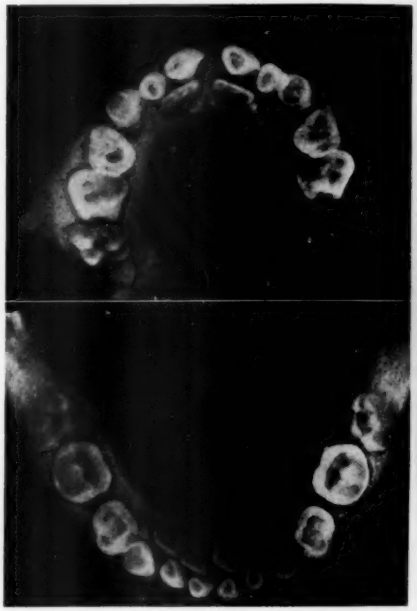

FIG. 3.—The positions of the unerupted teeth. The teeth are neatly packed in the alveolus. The milk teeth are slightly spaced while the permanent incisors, lying lingually, are slightly crowded because of their greater size. These positions of the unerupted teeth may persist for a time after eruption.

Abnormalities of the teeth.—Although parents sometimes assert that the teeth 'came through decayed' this is never true, and defects of the deciduous teeth are rare, as they are mostly formed during the protected period of intra-uterine life. Nevertheless, the teeth may decay astonishingly rapidly after their eruption so that in some cases they are destroyed down to the level of the gum by the age of 4 or 5 years. The giving of vitamins or calcium salts for defective structure of the teeth or caries is valueless but attention should be paid to the diet and an attempt made to find out whether excessive quantities of sweets are being eaten, or cakes or biscuits are given at bedtime. It is also important that decayed milk teeth should be preserved by filling, just as carefully as the permanent teeth. Early loss of the milk teeth is an important cause of irregular eruption and misplacement of their successors.

SYSTEMIC UPSETS ASSOCIATED WITH TEETHING

From the era when teething was regarded as an important cause of diseases,

ranging from asthma to convulsions, the pendulum has of course swung to the opposite extreme. It seems, in fact, unlikely that there is any way in which the eruption of a single milk tooth can upset gastro-intestinal, respiratory, nervous or urinary function. Credulity is stretched to its limit by the suggestion that such disturbances can all be corrected by means of an aperient. Nevertheless, there are still many today who would disagree with the thesis that teething only causes teeth. Some local discomfort, salivation, fractiousness, perhaps disturbance of sleep, so that the child is off-colour for a day or two, can not unreasonably be regarded as a result of teething and these symptoms rectify themselves. The gum round an erupting tooth can become infected so that there is increased redness, swelling and tenderness but this is rare and more widespread infection is very rare indeed. The poorly infant such as the bronchitic also tends to be worse at these times.

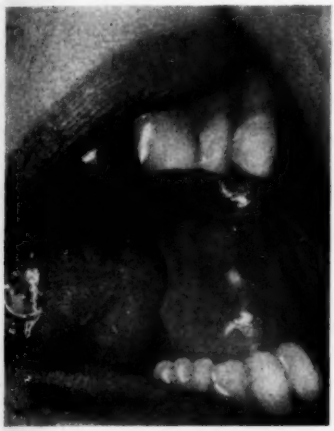

FIG. 4.—An eruption cyst. The cyst overlies an upper molar and forms a bluish dome-shaped swelling. A mirror is held below the cyst to show its superficial appearance.

The essential point about teething is not to ignore what may be the early symptoms of some serious infection. Diarrhœa and vomiting, especially, should never be ascribed to teething and, as Everley Jones (1947) pointed out, the onset of otitis media, throat infections, meningitis, pneumonia and pyelitis can also be overlooked during teething, if not sought for.

No treatment is necessary for teething itself, and there is no justification for incising the gums to facilitate eruption, unless some obstruction, such as an eruption cyst, is obviously present. If, however, the child is very fretful, and careful examination has excluded disease elsewhere, a sedative such as chloral hydrate, 1 grain (60 mg.) two or three times a day, may be helpful. Teething powders containing mercury carry with them the danger of pink disease and should never be used. Teething jellies containing one of the modern non-irritant antiseptics are harmless but, though some believe that massaging the gum is helpful, their value is unproved.

ORAL INFECTIONS THAT MAY COINCIDE WITH TEETHING

Infective stomatitis is *not* caused by teething but is mentioned because it may develop at this time. There are only two important oral infections of infancy, thrush and herpetic stomatitis.

Thrush tends to appear earlier than the first teeth: that is, during the first three months. The whitish or creamy plaques are easily recognized

(fig. 5). Treatment with gentian violet or nystatin is effective and is important because of the danger of spread of the infection, especially by aspiration.

Herpetic stomatitis is usually of later onset: 1 to 3 years is the peak period. The disease is clear-cut with the appearance of vesicles scattered over the tongue (fig. 6) and cheeks especially. These vesicles rupture leaving painful shallow ulcers resembling the aphthæ ('dyspeptic ulcers') of later years. There is fever, which is often high, enlarged cervical lymph nodes and the usual features of an acute infection. There is no specific treatment but tetracycline is often given, probably in the hope of preventing secondary infection. The child should be put to bed, and a soft diet, especially ice cream, prevents irritation of the painful ulcers. The infection usually clears up in a week or two.

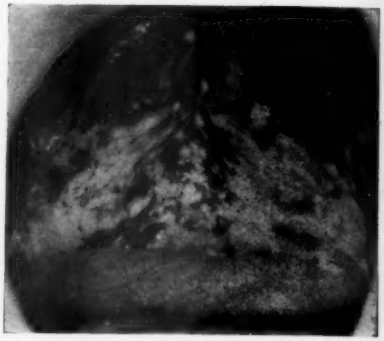

FIG. 5.—Thrush. The characteristic whitish or creamy colonies of *Candida albicans* form patches or confluent plaques lying superficially on the mucous membrane. They are seen here on the soft palate.

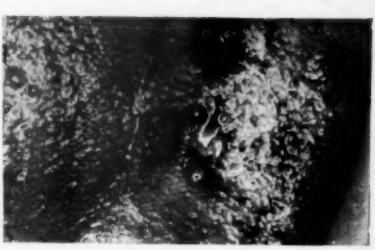

FIG. 6.—Herpetic stomatitis. Small vesicles appear all over the oral mucous membrane, and rupture leaving painful shallow ulcers which are seen here on the dorsum of the tongue.

CONCLUSIONS

In brief, then, teething cannot justifiably be regarded as a cause of illness, but there may be discomfort, disturbance of sleep or irritability, for which a harmless sedative is suitable treatment. More severe symptoms are due to infection elsewhere in the body and it is essential that this should not be overlooked.

Abnormalities of the milk teeth are rare, but they may take up rather irregular positions. This is usually of no importance but it may be wise to consult an orthodontist especially if the permanent teeth are irregular.

Figures 4, 5 and 6 are reproduced from 'Essentials of Dental Surgery and Pathology', by R. A. Cawson, by kind permission of J. & A. Churchill Ltd.

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NEW GROWTHS IN THE MOUTH

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THE present status of the most common neoplasms, premalignant conditions and examples of hyperplasia which occur in the mouth will be the main concern of this article. Hence emphasis will be given to recent trends and advances in diagnosis and treatment of lesions commonly encountered, and the rare lesions will not be discussed. Non-neoplastic causes of expansion, e.g. cysts, bone dysplasias and dystrophies and odontomes, will be briefly mentioned, mainly from the point of view of differential diagnosis.

The new growths in the mouth which are the principal causes of morbidity and premature death are carcinoma of the lip and oral mucosa and their early detection imposes a responsibility upon practitioners. Early detection allows advantage to be taken of the results of modern treatment; at the same time it is important that less rapidly destructive lesions should not be allowed to develop without investigation and diagnosis. It is probable that with the development of public interest and of medical and dental services more patients with suspicious oral lesions are seen earlier by their medical and dental practitioners now than formerly. Advances in preoperative and postoperative care and surgical treatment and the introduction of isotope and megavoltage radiotherapy are encouraging and are reflected in improvements in five-year survival rates.

ETIOLOGY

Knowledge of the etiology of neoplasms is advancing steadily, and research has brought to light intriguing elements of universality and specificity in 'the neoplastic change'. On the one hand a single carcinogenic hydrocarbon can induce malignant tumours of different kinds: e.g. carcinoma of skin or kidney or sarcoma of soft tissue or bone. On the other hand, indistinguishable skin carcinomas can be produced by different carcinogenic agents, including irradiation and carcinogenic chemicals (Willis, 1960). This being so, whilst consideration of specific tumours identified by cell type and behaviour occupies much of the literature, it may be granted that discussion of neoplasia in general has value, and that results obtained in one context may have applicability in others. Hence the evidence produced that the effect of several exposures to a carcinogen is cumulative (Roe and Salaman, 1954) and that the effect of one exposure is irreversible (Berenblum and Shubik, 1949) is noteworthy. The action of co-carcinogenic factors which will potentiate the effect of known carcinogens has been stressed by many authors. Roe (Roe, 1961; Roe *et al.*, 1959) suggests that they may act in human bronchial carcinoma associated with cigarette smoke. Once skin has suffered an exposure to a carcinogen, a later non-specific

agent such as minor trauma, not carcinogenic in itself, can cause neoplasia (MacKenzie and Rous, 1941).

The mouth presents local factors of significance. Work on experimental chemical carcinogenesis in the oral mucosa of the mouse suggests that the natural defences of the mouth to malignant growth may include the action of the tongue and saliva in mechanically preventing substances from lying for long periods in contact with the epithelium (the skin by contrast has no comparable cleansing mechanism), and that ulceration over periods is significant in allowing access of substances to deep layers of the epithelium (Goldhaber, 1957). The relative ease with which squamous-cell carcinoma can be induced by painting the epithelium of the cheek pouch of the hamster with carcinogen (Salley, 1954) suggests that inaccessibility and lack of cleansing play a part.

FIG. 1.—Male aged 52. Gumma just inside angle of mouth. History of swelling of right cheek for one month, without pain.

It is likely that significant factors in the induction of lip cancer are sunlight in fair-skinned persons (Laband and Bumsted, 1955) and, in certain geographical areas, tar from fishing nets and rough clay pipes, particularly if these are smoked with a jagged broken stem. The view that inside the oral cavity tobacco, jagged teeth, bad oral hygiene, betel-nut chewing (in certain circumstances) and syphilis are factors is supported by much evidence. The role of tobacco and its smoke is suggested by the fact that tobacco-smoke condensate is carcinogenic to at least two species of animals (Wynder, 1959) and by the predilection for the tongue and palate of oral cancer in Indians smoking cigars with the lighted end within the mouth. Investigations of the relationship of betel-nut chewing to oral cancer suggest the importance of accompanying trauma to the tongue and cheek epithelium from worn, sharp teeth (Balendra, 1949) or accompanying metaplasia of oral epithelium due to vitamin A deficiency (Orr, 1933).

The evidence associating syphilitic glossitis, usually with hyperkeratosis, with carcinoma is strong. In other parts of the mouth (fig. 1) the association between syphilis and carcinoma is not clear. Hyperkeratotic or atrophic lesions of the oral mucosa showing histological evidence of dyskeratosis are

'premalignant'. Atrophy of the oral or pharyngeal mucosa may represent a change in the epithelium which predisposes it to malignant change. The atrophy in the Plummer-Vinson syndrome is a predisposing factor (Willis, 1960; Weisberger, 1957); that in vitamin B deficiency or some senile or focal hyperkeratoses may also be. There has been a striking reduction in this country over the past thirty years in the mortality from tongue cancer in the male, whereas in women the rate has remained steady. The sex ratio which was 10 : 1 in 1925 was 2 : 1 for the period 1951-55. As suggested by Cade and Lee (1957), this may be due to the present relative infrequency of gross hyperkeratotic lesions, syphilis and gross oral sepsis.

Among possible systemic factors relating to oral cancer the differences in individual, race, and species susceptibility must be mentioned. The

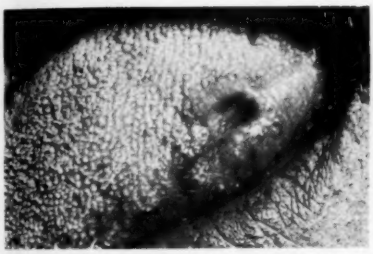

FIG. 2.—Male aged 24. Recurrent aphthous ulceration of tongue mucosa. This ulcer had been present for a week. History of occasional oral ulcers for four years.

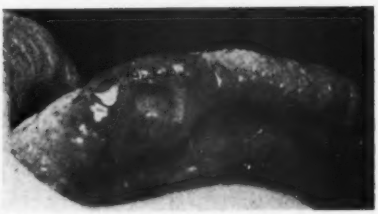

FIG. 3.—Female aged 16. Recurrent aphthous ulceration of tongue mucosa. History of recurrent crops of ulcers in mouth for three years.

finding of a significantly high frequency of group A in patients with tumours of salivary tissue at the expense of those with group O blood has been reported (Cameron, 1958).

When all these factors are considered the interplay of multiple factors, different in different subjects, including exposure to a carcinogen (probably almost inevitable), some other damage to tissue, and the passage of a latent period suggests itself.

PRESENT METHODS OF DIAGNOSIS

The precision and reliability of a diagnosis are usually increased if the data from clinical sources, including special investigations such as radiography, are supplemented by data derived from the techniques of pathology. Boyle (1955) reported that in 1,268 specimens reported upon in his department of oral pathology there were five clinically unsuspected neoplasms and that in nine the clinical suspicion of malignancy could not be confirmed. It should be added that it is possible for a secondarily infected traumatic or recurrent aphthous ulcer of the tongue (fig. 2, 3) to be indistinguishable clinically from an early carcinomatous ulcer.

The instrument most commonly used for procuring oral biopsy material for histological and bacteriological investigation remains the scalpel blade. The use of

an angled gingivectomy knife or scalpel blade holder offers advantages at the back of the mouth, and the biopsy drill (Miles, 1951) is suitable for central lesions of the jaw bone.

The opinion of a pathologist cannot, in general, be obtained without the passage of a little time, and the risk of promoting or causing the spread of a malignant tumour whether it be by the passage of a few exfoliated cells by a natural channel or by its metastasis by lymphatic or blood vessels. This disadvantage must be weighed against the certainty with which many otherwise doubtful lesions can be diagnosed. These include the majority of neoplasms and certain well-known infections. If a certain and detailed diagnosis of the cell type and malignant potentialities of a tumour cannot be made on histological grounds alone, e.g. some melanomas and certain very anaplastic tumours, valuable guidance can, nevertheless, often be given. In any case every effort must be made to ensure that as much information as possible is obtained from the biopsy specimen once the decision to carry out a biopsy has been made. To this end a biopsy of tissues within the mouth should, in general, be carried out in a hospital where definitive treatment will be given to the patient, and, it should be added, preferably in a department where personnel experienced in the techniques and aware of the requirements are available.

The hæmatoxylin and eosin-stained section of paraffin-embedded material is still the mainstay of histopathological diagnosis and, although the development of the cryostat has allowed excellent frozen sections to be cut and histochemical advances continue apace, these, so far as oral diagnosis is concerned, are of use only in special circumstances. As examples of what may be expected from histochemistry in the future, may be mentioned the investigation of the process of keratinization in normal stratified squamous epithelium and in keratotic lesions of the mucosa by Barrnett and Seligman's technique for SS and SH groups, and the suggestion by Cahn and his colleagues (1961) that the integrity of the basement membrane of the oral epithelium as shown by a periodic acid Schiff stain, is lost in malignant or potentially malignant lesions.

The techniques of exfoliative cytology, although established in the investigation of malignancy in the other parts of the body, e.g. the uterine cervix, are not yet in this position in respect of oral lesions. A start has been made, however, by Cawson (1960) who points out the value of the method in patients in whom bleeding is a risk. Another advantage is the ease with which extensive suspicious areas can thus be examined at frequent intervals with minimal upset to the patient. This in itself can be a disadvantage, however, as it may lead to the postponement of definitive histological examination.

There can be no doubt that tissue must be obtained for normal histological examination, either by total excision if the lesion be small or by biopsy or surgical operation, whenever malignancy is suspected clinically. All dubious ulcers not healing within fourteen days after the elimination of possible direct causes, all persistent hyperkeratotic lesions, all indurated plaques, and all nodules or warty growths must be investigated histologically.

'PREMALIGNANT' CONDITIONS OF THE ORAL CAVITY

It may be argued that the designation of any lesion as 'premalignant' is unsatisfactory because the decisive question is whether malignancy is or is not present, but evidence such as that in experimental chemical carcinogenesis in the skin of 'successive stepwise changes' (Klein, 1959) makes the concept of premalignancy a valuable one. The principal types of lesion to be considered are the hyperkeratotic area and the atrophic: i.e. the white and the red.

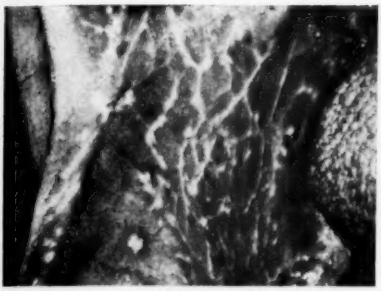

FIG. 4.—Female aged 57. Lichen planus of oral mucosa from commissure backwards. History of soreness in mouth for ten months.

Hyperkeratotic lesions. — The term 'leukoplakia', although deeply entrenched, should be used with great caution. If used at all it should imply an increased likelihood of subsequent malignancy. It should imply dyskeratosis: i.e. disorderly changes in the cells of the epithelium not thought to be fully reversible, and this judgment requires histological evidence.

'The location of the lesion, its colour or size, give no information as to the presence or absence of dyskeratosis and are of little diagnostic value' (Bernier, quoted by Laband and Bumsted, 1955).

Most people, however, would agree that loss of plasticity of the mucosa is significant.

White patches upon the oral mucosa may be acute or chronic in duration. The acute do not concern us here and many of the chronic persist for long periods without malignant change.

Chronic white patches on the oral mucosa or lips may be found associated with exposure to sunlight or tobacco, and with irritation from dentures, sharp teeth, or chemicals. The familial, white, folded gingivostomatitis is congenital and well described by its name. Oral lichen planus (fig. 4), usually presenting in some part of the lesion the typical raised pattern of pearly lines and dots, and lupus erythematosus may or may not be accompanied by skin signs. The pattern which may be produced in individuals by tobacco smoke or juice differs according to whether a pipe, cigarette (fig. 5) or cigar is smoked. Early changes comprise a reddened mucosa with prominent ducts of minor palatal glands. In my experience some lesions clinically diagnosable as lichen planus lack many of its classical histological features. Malignant change has been reported in lesions resembling lichen planus.

Atrophic lesions (fig. 6) have been mentioned under 'etiology'. These red areas of thinned mucosa may occur alone or in conjunction with white hyperkeratotic areas.

Clinical management.—Histological examination should be carried out on hyperkeratotic or atrophic lesions which persist after the elimination of known factors. Those showing dyskeratosis should be examined at three-month intervals to exclude induration, ulceration, or other evidence of malignancy. Those without evidence of dyskeratosis, unless trivial, should be examined at intervals dependent upon the clinical picture.

PRIMARY MALIGNANT NEW GROWTHS OF THE ORAL SOFT TISSUES

Incidence and distribution.—The most important neoplasm within this group (growths of the vermilion border of the lip will be included) is the squamous-cell carcinoma. Basal-cell carcinomas occur, but less commonly than on the skin of the face, and lympho-epitheliomas and transitional-cell carcinomas are found towards the back of the mouth. Carcinoma-in-situ is found histologically. The oral manifestations of the leukæmias include hyperplasia of the gums, pallor, bleeding from the gums and petechiæ. Malignant types of tumour of minor and major salivary glands present as swellings of recent onset. Melanomas and sarcomas of soft tissue are uncommon.

FIG. 5.—Male aged 47. Smoker's keratosis affecting lip and edentulous alveolar ridge of palate, in pattern suggesting contact with smoke. The patient smoked 50 to 60 cigarettes a day and had not noticed the lesions.

FIG. 6.—Female aged 81. Atrophic glossitis, carcinoma of tongue.

Clinical considerations.—Squamous-cell carcinoma of the oral mucosa (fig. 6, 7, 8, 9), which is commoner in men than in women, starts as a small indurated plaque. Patients may present with an ulcer having a raised border, an ulcerated fissure: e.g. in a hyperkeratotic plaque, or with a warty growth. Pain is not an early symptom but there may be a complaint of soreness if acid foods are eaten. In later stages severe pain may dominate the clinical picture.

Carcinoma of the lip occurs more commonly in males than females and usually upon the lower lip. Fair-haired and -skinned persons who work (or have worked) in the open air, particularly in sunny latitudes, are susceptible.

FIG. 7.—Male aged 35. Squamous-cell carcinoma of tongue. History of stinging pain in tongue with vinegar, for eight months.

FIG. 8.—Male aged 63. Keratinizing squamous-cell papillary carcinoma of tongue. Wassermann reaction positive.

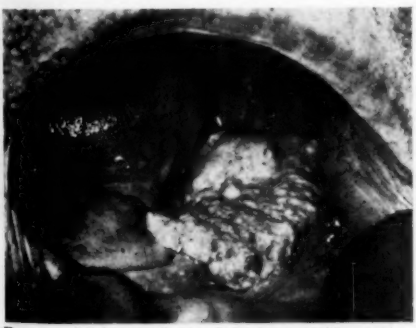

FIG. 9.—Male aged 64. Squamous-cell carcinoma of edentulous alveolus infiltrating ramus. History of swelling and pain for two months. Fungating, everted mass of soft tissue over edentulous ridge. Operation: Excision of horizontal ramus of mandible by Mr. C. Heanley on July 15, 1952. On February 14, 1961, no sign of recurrence, patient well.

Clifton and Hardin (1956) found in Louisiana that white males comprised 94 per cent. of their series; conversely negro women comprised only 1 per cent. In a group of 2,166 soldiers, Laband and Bumsted (1955) found 10 men under 40 all of whom had served in Korea, had worked out of doors and had fair complexions, who had hyperkeratotic lip lesions, five of which were premalignant. None of these men had syphilis or was vitamin deficient.

Carcinoma of the tongue usually occurs on the lateral border: Erich and Kragh (1959) found 77 per cent. of cancers of the anterior two-thirds on the lateral border.

The youngest patient in Gibbel's series of men was 31 years old, the oldest 87, with the average 53 years (Gibbel *et al.*, 1949). Metastasis to lymph nodes on one or both sides occurs early. The prognosis is influenced by the size of the lesion on presentation, the sex of the patient and the presence of syphilis. Clifton and Hardin (1956) reported a five-year survival rate of 21 per cent. for lesions smaller than 2 cm. and 9 per cent. for those bigger than 2 cm. Erich and Kragh, however, in 1959, reported a five-year survival rate of 46 per cent. for carcinomas of the anterior two-thirds of the tongue. Marion Russell (1954) reported the interesting finding that women in Britain had a lower incidence, and a better (corrected) ten-year survival rate and that in them both local recurrence and subsequent cervical node involvement were less common than in men. Patients with syphilis and carcinoma had a worse survival rate than patients with carcinoma alone in the series analysed by Tiecke and Bernier (1954) from the Armed Forces Institute of Pathology.

The prognosis of a carcinoma involving other sites on the oral mucosa is worse if bone is

involved, or if it lies near the midline when bilateral lymphatic spread may occur early.

PRIMARY MALIGNANT NEW GROWTHS OF THE JAWS

Central tumours of the mandible cause expansion of the bone with pain often accompanied by paræsthesia as a fairly early symptom. In the maxilla the antrum allows some expansion to take place before bony enlargement is seen. Expansion of the jaw bones due not to new growth but to cysts is common, that due to bone dysplasias or dystrophies or odontomes rather uncommon. The commonest among the types of cyst occurring in the jaws is the radicular or 'dental cyst'. It arises from epithelial rests in the periodontal membrane stimulated to proliferate by inflammation usually from the necrotic pulp of the associated tooth. This cyst is certainly the commonest cause of expansion of the jaw in the presence of a discoloured or carious tooth. Cysts do not cause pain unless they become infected.

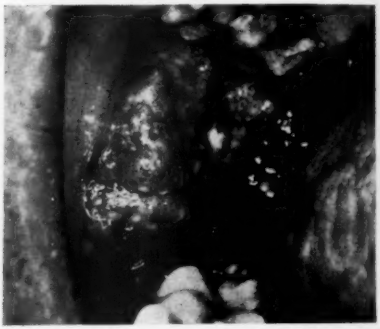

FIG. 10.—Male aged 17. Ameloblastoma. History of swelling in $\overline{87}$ region for three months, increasing in size. A fleshy lobulated mass arising behind $\overline{67}$ is seen. Operation: Hemimandibulectomy on September 30, 1960, and iliac bone graft on November 9, 1960, by Mr. G. R. Seward for Professor W. T. Irvine. On April 5, 1961, patient well, good function.

Ameloblastoma.—This is a locally invasive new growth arising from odontogenic cells (fig. 10). It is commonest in young adults, presenting as an enlargement of the jaw of some months standing. It affects the mandible more commonly than the maxilla, and the posterior part more often than the anterior. Metastasis is extremely uncommon. Radiography reveals typically a radiolucent area having a polycystic outline and may show that adjacent tooth roots have been resorbed. It should be stressed that not all radiographically polycystic lesions are ameloblastomas. It is well known that the benign developmental primordial cyst may simulate the ameloblastoma radiographically. The diagnosis of ameloblastoma must therefore always be confirmed histologically by an ample biopsy.

Carcinoma of the maxillary antrum causes expansion of the upper jaw if the alveolar process of the maxillary bone is involved. A nasal discharge containing blood and progressive unilateral obstruction suggest the diagnosis.

Osteogenic sarcoma.—This neoplasm arises in young adults, and in older patients with Paget's disease of the jaws. It causes an expansion of the jaw of fairly short duration. Other types of sarcoma occurring not very uncommonly in the jaws include the chrondrosarcoma (Miles, 1950) and the fibrosarcoma. The lesions of multiple myeloma are demonstrated radiographically

as clearly demarcated areas of increased radiolucency in the jaws as in other parts of the skeleton.

METASTATIC NEW GROWTHS

Metastases to the bone of the jaws are uncommon and usually bloodborne. Primary carcinoma of those organs from which metastases occur to the skeleton in general, e.g. of bronchus, thyroid, breast, prostate and kidney, must be considered. In Meyer's series (1957) the bronchus as the site of a primary carcinoma metastasizing to bone was twice as common (124 cases) as the next commonest site which was the breast (56 cases). Examples of lymphatic spread to the jaws include that from a carcinoma of the lower lip to the mandible and from the nasal cavity or sinuses to the maxilla. The submandibular and upper deep cervical lymph nodes, although not literally 'in the mouth' deserve attention because they drain a wide field of tissue in the head including the paranasal sinuses, nasal cavity and nasopharynx, and may become clinically enlarged due to secondary invasion before the primary growth has caused symptoms. The primary growth may be small and difficult to find and a detailed investigation of the area must be undertaken.

FIG. 11.—Male aged 25. Papilloma of tongue.

BENIGN NEW GROWTHS OF THE ORAL CAVITY

Some of the benign new growths of the oral cavity will be considered here. Those commoner lesions which by contrast are best regarded as hyperplastic or reparative (i.e. which apparently do not progress after the elimination of initiating factors) including the epulides and fibro-epithelial polyps, will be treated in the next section.

The peripheral fibroma is less common than the epulis or fibro-epithelial polyp from which it will be distinguished histologically, and presents as a painless swelling on the gum or mucosa. It may be either pedunculated or sessile and hard and soft types occur. Oral lesions occur in neurofibromatosis (Hankey, 1933).

The papilloma (fig. 11) is commonly seen. It is recognized clinically by the pale finger-like processes on its surface which may be short or, in the mouth, may grow long and thread-like. The type of squamous carcinoma arising as papilliferous tumour with induration at its base requires to be distinguished from it. In either case histological examination must be carried out.

Lipomas occur less commonly in the mouth than elsewhere in the body; they may contain much fibrous connective tissue.

Osteomas and benign tumours comprising connective tissue, bone and

cartilage, arise as slowly growing tumours attached to the jaw; they have to be distinguished from exostoses and the bony developmental tori commonly found on the lingual aspect of the mandible in the premolar area and in the midline of the hard palate.

Most *adenomas* of major or minor salivary glands are found to be pleomorphic histologically, at least in part, and some are locally malignant. The admirable fascicle by Foote and Frazell (1954) has advanced knowledge of these tumours. The minor glands of the palate are not infrequently involved (fig. 12). It must be remembered that these tumours in this site may be soft and that the fluctuation of a palatal abscess of dental origin may be simulated. Inside the lips and cheek small traumatic mucous extravasation cysts require exclusion, usually by histology after excision.

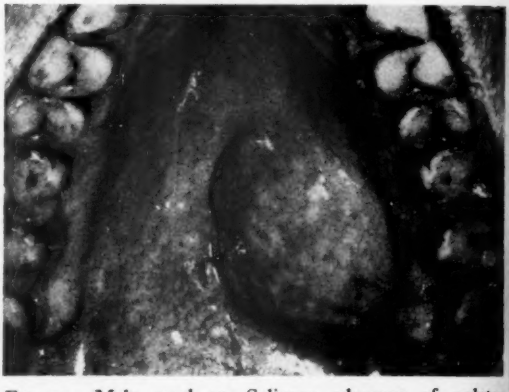

FIG. 12.—Male aged 30. Salivary adenoma of palate. History of swelling of palate first noticed two weeks previously. No pain. Swelling was elastic, almost fluctuant.

Most hæmangiomas are probably malformations rather than neoplasms. On the gum they have to be distinguished from epulides, particularly the pregnancy epulis and the giant-cell-epulis.

HYPERPLASTIC AND REPARATIVE LESIONS OF ORAL MUCOSA AND JAW BONES

These are not true neoplasms. Examples often occur on the oral mucosa (which includes the gum) and must be differentiated from neoplasms. Histological examination is required. Malignant change is a possibility when ulceration of long standing is present.

The *fibrous epulis* arises on the gum as a rounded or lobulated painless firm swelling usually interdentally on the buccal aspect (fig. 13). It represents a hyperplastic reaction of the gum to chronic irritation, usually from the edge of a dental restoration or a small piece of subgingival dental calculus. Initially pink or red, it becomes pale and less vascular as time progresses, although trauma during mastication is common. Cooke (1952a) found that women, particularly between the ages of 20 and 45, were much more commonly affected than men.

The *giant-cell epulis* arises on the gum usually as a painless, firm, maroon-coloured, vascular, lobulated swelling on the buccal aspect of the arch

anterior to the molar teeth. Cooke (1952b) found that they were twice as common in women as in men and that nearly half his series occurred in women between 20 and 45 years of age. Thoma and Goldman (1960) regard the giant-cell epulis as a peripheral counterpart of the central giant-cell reparative granuloma of the jaw. Lesions similar to the giant-cell epulis can occur in hyperparathyroidism.

Chronic inflammatory hyperplasia of oral mucosa occurs in response to chronic irritation. The flanges of a full denture which has been worn unchanged for many years or the now rarely seen 'suction plate' (fig. 14) are examples of agents which will cause this. The *fibro-epithelial polyp* of the cheek (fig. 15) or tongue will persist without growing after the original stimulus such as a rough tooth or denture clasp has ceased to act.

FIG. 13.—Female aged 38. Ulcerated fibrous epulis, buccal to $\overline{43}$. History of lump on gum first noticed four weeks previously. It bled on occasions.

The *central giant-cell reparative granuloma of the jaw* has been described fairly recently (Jaffe, 1953), but central giant-cell tumours resembling those in long bones also occur (Shklar and Meyer, 1961). Hyperparathyroidism must be excluded in all central giant-cell lesions of the jaw as the lesions are not distinguishable histologically.

ADVANCES IN TREATMENT OF ORAL NEW GROWTHS

Surgical and radiotherapeutic methods alone or in collaboration are the methods of treatment of a patient with oral cancer when cure is the aim. Naturally, palliation by these methods and the medical management and support of the patient throughout the course of his disease remain important.

Among the advances in surgical treatment, preoperative correction of malnutrition and anæmia, the development of the technique of the excision of the primary growth in continuity with the field of lymphatic drainage and improved blood transfusion, electrolyte supervision and anæsthetic techniques are to be noted. The danger of implantation of tumour cells during surgery is recognized (Cole *et al.*, 1961). Postoperative tube feeding of nutritive diets with vitamin supplements has advanced.

Advances in the replacement of tissue excised in the treatment of carcinoma have continued. Bone grafting, using autogenous bone, offers good results (Mowlem, 1944). Use of tantalum or chrome cobalt implants to

replace excised parts of the mandible and maintain function has been reported in the United States and this country. Such metal implants offer advantages over bone grafts when irradiation may be required at a later date.

The development of radioactive isotopes as sources of irradiation and of megavoltage therapy is significant. The latter allows reduced dosage to the skin. Moreover, a proportionately smaller fraction is absorbed by bone and thus the technique should reduce the risk of post-irradiation necrosis of bone (Jelliffe, 1961). Palliation and the treatment of carcinoma of the posterior part of the tongue are applications for megavoltage therapy. The advantages to be obtained from combined clinics and combined programmes of surgical and irradiation treatment are being realized.

FIG. 14.—Female aged 47. Hyperplasia of mucosa caused by denture 'suction plate'. This was an incidental finding in a patient attending for another reason.

During palliative treatment or in the terminal stages daily wound toilet and oral cleansing is required and the use of zinc peroxide paste for wound dressings has been reported (Beckstrand, 1948). Eddey (1960) reports the use of amiphenazole as a non-specific respiratory stimulant to allow opiates to be used in full dosage.

The treatment of benign neoplasms remains excision, whilst excision and removal of the cause are indicated in hyperplastic lesions.

FIG. 15.—Male aged 48. Fibro-epithelial polyp of mucosa of left cheek. History of lump inside cheek for many years.

CONCLUSION

Much has been achieved, but many problems in the etiology and treatment of oral cancer remain unsolved. Early diagnosis and treatment offer the best prospect for long survival.

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COMMUNITY CARE AND TREATMENT OF THE PSYCHIATRIC PATIENT

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THE long-established tradition that effective treatment of mental illness could only be given in a mental hospital has been disproved, for we have found that the greater proportion of patients can be successfully treated as outpatients. This has also brought us one step nearer to individual psychiatry—the ideal of all psychiatrists—and away from trying to treat large groups of sick people 'en masse'. In this article I present an account of the first four years of the Worthing and District Mental Health Service, which was started on January 1, 1957. A full account of the first ten months of the service has already appeared (Carse *et al.*, 1958).

ORGANIZATION

The area served by this Service is the same as that served by the psychiatric outpatient clinic of Worthing Hospital.

It extends eastwards for about nine miles, a similar distance to the west, and goes inland between eight and ten miles. The resident population amounts to approximately 160,000 and includes a large number of industrial as well as agricultural workers. There are no psychiatric beds in the county other than at Graylingwell Hospital. Patients are referred to the Service by their family doctors and no patient is admitted to Graylingwell without first being screened by the Service.

The headquarters of the Service are at The Acre, Worthing. This is a 20-bedded unit which belongs to Graylingwell Hospital, although it is situated over 20 miles away from it. It is a large house with an attractive garden and it lends itself admirably to being used as a day hospital. There are no resident patients. The medical staff consists of two full-time psychiatrists, Dr. Nydia Panton and Dr. A. Watt, whilst Dr. H. McBryde and I give part-time assistance.

THE RESULTS

It will be seen from table I that the number of cases referred to the Service has been remarkably constant and during the whole period we have averaged just over 100 new cases a month. Whilst approximately four out of every five of these have been satisfactorily treated as outpatients and only about 20 per cent. needed admission to hospital, so far there has been no waiting list. In addition, during this period we have provided follow-up treatment and supervision for nearly 200 patients discharged from Graylingwell Hospital. About one-third of the patients have attended the Worthing Hospital Clinic, which is now part of our outpatient service. Rather less than one-third were examined at the day hospital, whilst the remainder

were seen in their own homes. Incidentally we soon learned that in a number of cases one domiciliary visit was not enough and that subsequent visits were required. Between 20 and 30 patients attend the day hospital on five days a week. They arrive at 09.00 hours and leave at varying times up to 19.00 hours, according to their needs. Free meals are provided. As well as receiving treatment, all take part in occupational therapy and physical exercise. In addition, anything up to another 40 patients come to the day hospital by appointment for psychiatric treatment. Most of the

Year	Total number of cases			New cases			Follow-up cases		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
1957	441	937	1378	432	861	1293	9	76	85
1958	435	818	1253	429	787	1216	6	31	37
1959	497	891	1388	472	841	1313	25	50	75
1960	477	1022	1499	446	926	1372	31	96	127
Total	1850	3668	5518	1779	3415	5194	71	253	324

TABLE I.—Number of patients referred to the Worthing and District Mental Health Service.

treatments available in the hospital can be given to outpatients and they include individual and group psychotherapy, together with abreactive techniques, electrical treatment (modified when necessary), modified insulin, and the new drugs. Drug therapy is restricted to patients who are seen almost daily, so that any side-effects can be observed and treated. The clinical results have been most satisfactory and there is now no doubt that most patients prefer to have their treatment as outpatients.

The Worthing Service has changed considerably the role of the psychiatric social worker. Visiting the patients' homes ourselves has obviated the need for long case histories: instead of using the eyes of the psychiatric social worker, we now see for ourselves the conditions under which the patient lives and we are learning a lot by doing so. The psychiatric social worker can now spend more time with the patients in the day hospital; she can work with the psychiatrist in the patient's home in our endeavours to try and help him to sort out domestic and social problems which are factors in his illness, and finally she can assist in the rehabilitation of patients after treatment. We have also learned that domiciliary visiting should no longer be the monopoly of the psychiatrist and the psychiatric social worker. In certain cases a home visit by a member of the nursing staff can be much more profitable and I believe that in the future nurses will play an important part in domiciliary treatment.

At this early stage it is very difficult to assess fully the effectiveness of a community service. The patients undoubtedly dislike entering a mental hospital, but being at home in their normal environment they remain completely independent and are free agents: treatment therefore can only be given on a cooperative basis. From experience, however, we have found that with few exceptions this cooperation has been freely given during the whole course of treatment. Further, the patients' families are more involved

with the illness than is the case with inpatients. Here again, we have found that the great majority of families have not only been willing to have the patient at home but have welcomed the opportunity of assisting in his treatment. Time and much research will be needed before we know the full impact of community services on the community itself and on the mental hospital. In table II are details of the admissions to Graylingwell from the Worthing area during the past four years, and it will be noted

	Year	Male	Female	Total	Reduction compared with 1956 (percentage)
Before introduction of Service	1956	204	441	645	—
After introduction of Service	1957	108	176	284	56
	1958	78	169	247	61.7
	1959	109	160	269	58.3
	1960	106	190	296	54.1

TABLE II.—Number of patients admitted to hospital before and after introduction of the Service.

that since setting up the Worthing Service many more patients have had treatment as outpatients and the number going into hospital has been more than halved.

THE PROBLEM OF THE ELDERLY

Geriatrics is a subject which is preoccupying the minds of many psychiatrists, and the question arises as to whether an outpatient treatment service can do anything to help the older people. Worthing is a town with the highest proportion of people aged 65 and over of any town in England and Wales. The national figure is 10.8 per cent.—for Worthing it is 24.6 per cent.

Year	Under 65			65 and over		
	Male	Female	Total	Male	Female	Total
1957	323	680	1003	118	257	375
1958	341	563	904	94	255	349
1959	350	610	960	147	281	428
1960	369	698	1067	108	324	432
Total	1383	2551	3934	467	1117	1584

TABLE III.—Number of patients referred to the Service during the period 1957-60, showing the proportion who were over the age of 65.

As would be expected therefore a high proportion of the patients referred to the Service have been in the older age-groups (table III).

In the age-group, 65-74, an outpatient service can make a big contribution, for many of these patients are depressed and they respond well to treatment, and being old people who are more dependent upon the familiar and often disturbed by leaving their own homes they are grateful for our help. In 1956, 128 of these patients from the Worthing area were admitted

to hospital. In 1960 there were 57 admissions. This is a reduction of 55·5 per cent. on the control year. With regard to the age-group of 75 and upwards, the impact of the Service has not been so great. In this group, which is steadily increasing, we get some depressives, but we also have the dementias, terminal confusional states and senile psychoses. The complete solution has obviously not been found, and much more research is required, but the Worthing Service reduced the number of patients coming into hospital from 70 in 1956 to 59 in 1960, a reduction of 15.7 per cent. (table IV).

The impact of the Worthing Service has been, of course, mostly on what would formerly have been short-stay recoverable patients. With few exceptions these are now treated as outpatients. There could therefore be some apprehension that only long-term patients with a poor prognosis, together with an increasing number of senile patients, are being admitted to hospital. In July 1961, a follow-up study was made of the 1957 admissions and the results are shown in table V. From this it will be seen that only 11 patients of the 284 admitted during 1957 remain on the books. There is no evidence here therefore that the hospital is being downgraded and receiving only terminal and untreatable cases. This opinion is

	1956			1960			
Age-group	Male	Female	Total	Male	Female	Total	Reduction compared with 1956 (percentage)
65-69	18	46	64 } 128	12	15	27 } 57	55·5
70-74	12	52	64 }	7	23	30 }	
75-79	10	27	37 } 70	12	20	32 } 59	15·7
80+	9	24	33 }	9	18	27 }	
Total	49	149	198	40	76	116	41·4

TABLE IV.—Number of elderly and aged patients admitted to Graylingwell Hospital before the introduction of the Service and during the fourth year of its operation.

reinforced by a follow-up study of the 1958 admissions made in July 1961 (table VI). Only 21 of the 247 admissions continue in hospital, and most of these are in the later age-groups. Actually, the types of patient being admitted today are similar to those admitted before the Worthing Service was introduced; only they are fewer in number and for clinical and social reasons they could not be adequately treated as outpatients. So far as Graylingwell is concerned therefore Leyberg's opinion that 'it is doubtful whether it (the hospital) will continue to receive patients mostly with a good prognosis' (Leyberg, 1959) does not apply. Incidentally, during the past three years the number of patients on the books of the hospital has gone down by 10 per cent. and there is now no overcrowding.

DISCUSSION

By 1956 much had been done to educate the public about mental illness and

particularly the importance of early treatment. The general practitioners had also attended many clinical meetings to keep them abreast of modern developments and the necessity for prompt diagnosis. At the same time the hospital had been upgraded and made acceptable to the general public. These conditions prevailing, it is not surprising that admissions to Graylingwell rose from 735 in 1950 to 1,345 in 1956, and it appeared that Parkinson's Law was in full operation. The Worthing Community Service has undoubtedly stopped this spiralling admission rate. Good public relations

	Number of patients admitted in 1957	Results of follow-up in July 1961		
		Discharged	Dead	Still on books
Male	108	90	16	2
Female	176	144	23	9
Total	284	234	39	11

TABLE V.—Results of follow-up study of patients admitted to hospital during first year of the Service.

are essential for such a service to operate efficiently and we are fortunate about this in Worthing. Whilst almost any kind of patient can be treated as an outpatient or at home if the background is favourable, in the main a service such as we have in Worthing is designed for the treatment of psychiatric patients in the early stage of their illness. These are the patients who were formerly short-term, non-statutory patients and who were largely responsible for the great increase in the admission rate. These are now treated effectively as outpatients and they prefer it this way: a domestic upheaval is avoided, and in many cases there is no loss of employment.

To say that the Worthing Service 'appears to have reduced the admission rate almost to the level of national expectation' (Parnell and Skottowe, 1958) does not take into account local conditions. In the first place, the people of Worthing and district are no longer afraid of mental illness and their doctors refer them to us promptly. Secondly, the hospital has been made to meet the requirements of the public. Thirdly, the geriatric case load of Worthing which we have to carry is the highest in England and Wales. I feel that if these conditions obtained throughout the country the national admission rate would be much higher than it is said to be—unless outpatient treatment services were introduced. The reduction in the number of admissions, however, is not necessarily the best yardstick to use when judging the success of an outpatient treatment service. Now that we are no longer obsessed with the idea that psychiatric treatment automatically means inpatient treatment in a mental hospital, we can place the hospital in its right perspective in relation to other treatment services available. What we are trying to provide is a comprehensive scheme which will best meet the needs of all kinds of patients. From experience we have found that four out of five of the patients referred to us can be successfully treated while still remaining in the community. For the remaining 20 per cent.

inpatient treatment was essential, but having an outpatient service makes it easier for patients to be discharged and continue their treatment at home. Finally, we have also found that the hospital can render a valuable service to the community by admitting patients for a stated period to enable relatives to have holidays or to tide them over some domestic crisis. It is felt therefore that a psychiatric service is better assessed on how well it meets the needs of the patients and the community, rather than by placing all the emphasis on a massive reduction of the admission rate.

	Number of patients admitted in 1958	Results of follow-up in July 1961		
		Discharged	Dead	Still on books
Male	76	59	13	6
Female	169	128	26	15
Total	247	187	39	21

TABLE VI.—Results of follow-up study of patients admitted to hospital during second year of the Service.

All patients are referred to the Service in the first instance and then the decision is made as to hospital or outpatient treatment. We feel that to give outpatient treatment effectively the patient must be able to give his full cooperation, have a favourable background and need only those treatments which are available for outpatients. When these requirements cannot be fulfilled we advise immediate admission and, whenever possible, as informal patients. The Worthing Service itself has done much to improve public relations and the patients come to us without delay. In this respect we are grateful to the general practitioners: all of them use the Service, some extensively, they take a keen interest in our work and a group of them have just completed a course of instruction in psychotherapy and are now treating some of their own neurotic patients.

The largest group of patients referred to us consists of those suffering from the affective disorders, mostly depressions. Understandably, there might be some apprehension that in treating large numbers of depressed patients as outpatients the suicide rate for the district would be increased. This, however, has not proved to be the case. Through the kindness of H.M. Coroner we have been given access to all the files dealing with suicides and the following are the facts: in 1956, the control year, there were 20 suicides; in 1957 there were 22, in 1958, 21, in 1959 there were 20, and in 1960 there were 15 suicides. Where the requirements already mentioned are present we believe that these depressed patients who do ask for our help can be safely treated as outpatients. There should, however, be no delay. Neurotic patients form another large group. Anxiety states are by far the most common, followed by the hysterias and some obsessional states. Giving psychotherapy to these patients makes heavy demands on one's time, but we feel that it is better psychiatric practice to treat them while still in the community and, indeed, only in special circumstances do we admit them to hospital.

Working in the Worthing Service during the past four years we have learned many lessons. We have been able to prove that the community care and treatment of the psychiatric patients is a practical possibility. We have also learned a great deal from personally visiting the patients' homes and we now feel that this is an essential part of the work of any psychiatrist. A patient in hospital is largely an artificial person living in a strange environment, whereas an outpatient always remains a free individual who continues to live in the community to which he is accustomed: the authoritarian methods used by some hospital doctors and nurses can therefore never be applied. We have learned, however, that when the community has been educated and enlightened about the importance of early treatment it is quite willing to contain those of its members who are mentally ill so long as adequate therapeutic facilities are immediately available.

THE FUTURE OF THE MENTAL HOSPITAL

Finally, what is the future of the mental hospital? While I have already shown that providing more community care for patients does not mean that only chronic cases with a hopeless prognosis are being sent into hospital, in the course of years there will undoubtedly be great changes in our mental hospitals. In fact, the process of winding up our mental hospitals has already begun, for many are now reporting a steady reduction in their resident population. This is not difficult to understand when it is remembered that up till recently the main reason for our having such large mental hospitals was for the accommodation of long-stay and senile patients. Less than 20 per cent. of the wards are devoted to the treatment of acute or short-term cases, and even these wards will become much less active as more patients receive their treatment while still in the community, and those who do require inpatient treatment are admitted to the psychiatric units attached to general hospitals. I feel, however, that one of the most encouraging features of psychiatric practice today is that so few of our patients become chronic or long-stay cases. The need for hospital beds therefore will steadily decrease in the future. Unfortunately throughout the country we still have many thousands of long-stay patients. With modern methods and treatments, however, and particularly drug therapy, a good proportion of these will in time be rehabilitated and enabled to return to the community. The remainder, while showing improvement, will regrettably still need to remain in hospital. On the other hand, it is reasonable to forecast that in ten years' time there will be many empty beds in our hospitals; in twenty years even more, and in thirty years' time there will be very few patients in any mental hospital—or, indeed, any mental hospitals as we know them today.

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A NEW DRUG FOR THE REMOVAL OF TAPEWORMS

By E. Ll. LLOYD, M.B., D.T.M. & H.
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EVEN when there were not many medicines that worked, in the treatment of tapeworm Male Fern held an honourable reputation for delivering the goods. With it went the ritual of some days on a fluid diet and purging, it didn't taste nice, the worm was usually passed in pieces, and at the end there was rummaging in the pot for the broken-off head, sometimes not there. Mepacrine was better at leaving the head on the worm, and much of the ritual could be left out, but it made some patients, especially the women, vomit and feel very ill. It could fail. Dichlorophen, borrowed from the dogs, has its place, but at best needs a wait of four months to be sure that it has fully worked. The search has gone on for a better drug, matching the standards set by penicillin, cyanocobalamin, chlorothiazide and so many others.

THE TABLETS

Samples of 'yomesan' left for treatment of patients under the care of Dr. F. J. Wright looked impressive. Its chemical name is N-(2^1 chlor-4^1-nitrophenyl)-5-chlorsalicylamid, a hyphenated relative of acetylsalicylic acid (aspirin), and even cats, touchy creatures about anything toxic, take it safely by mouth. It had been praised in Berlin, Wuppertal, and in the Imperial Guard Hospital, Addis Ababa.

SAMPLE PATIENTS

J.B., a male, had passed segments since 1957. Prospects of military service had made him try to rid himself of the nuisance. In March and August, 1960, he was treated with mepacrine without success but was very sick. In September he took dichlorophen and had three months' peace. In December he tried amodiaquine with no discomfort and no success.

Here is the timetable for one successful sample of 'yomesan':—

January 2, 1961	12.00 hours	'Senokot' granules, one teaspoonful. Fluid diet.
	19.30	Large soft stool with five segments (*T. saginata*).
January 3, 1961	05.00	'Yomesan', 0.5 g. x 2.
	06.00	'Yomesan', 0.5 g. x 2.
	08.00	Injection of pituitary (posterior lobe) B.P.C., 0.5 ml.
	08.30	Breakfast.
	09.00	7 feet (2 metres) of worm and a separate inch (25 mm.) with scolex passed.

The tablets tasted nice. He was moved twice, once before treatment to clear the gut and confirm the diagnosis and once with pituitary hormone to pass the worm. He was home for lunch. The only grumble here was that the worm's neck was broken.

Mrs. H., in July 1959, told her doctor that she was passing small white worms. These were treated as threadworms with piperazine till September 1960, when the doctor's partner took her over, made her draw her worms, said: 'These are no thread-

worms' and gave her mepacrine which made her vomit from 18.00 to 22.00 hours. After six weeks of freedom segments recurred. In December 1960, she was given Male Fern. On March 7, 1961, segments recurred.

After breakfast on March 10, 1961, she was admitted, and her scybala with some segments of *T. saginata* were cleared by bisacodyl suppository and 'senokot'. On March 11, she was given 'yomesan' and, to try to prevent the worm's neck being broken, pituitary hormone and breakfast were put forward half-an-hour, a soap and water enema was given at 08.30 hours and with the return came 3 yards (2.75 metres) of worm with scolex all in one piece.

Mr. W.'s doctor telephoned on Saturday morning, June 17, 1961, that it was awkward to get away from the butcher's shop, where Mr. W. sampling cooked meats for sale sometimes found them raw. He accepted the invitation to come to hospital on Saturday night, chewed (to get the emulsion right) 'yomesan' tablets at 05.00 and 06.00 hours on Sunday, had pituitary hormone at 07.45 hours and, after a bowl of porridge, passed his worm at 08.10 hours in three lengths, one length of 2 feet (60 cm.) having the scolex at the end.

Three successes are not much to add to the foreign lists, but after failures with other drugs it seems fair to pass on the stories of this one. It may be that 'yomesan' is the better drug that has been sought. With it a patient could start treatment on Saturday afternoon and count on being in time for Church on Sunday, to give thanks.

HEAD HUNTERS AND GRUDGING GUTS

For head hunters sluggish guts remain a problem, with their grudge against giving up the worm even when 'yomesan' has made it let go.

J.T. went to his doctor about piles in March, 1961. As well as the piles his doctor found a segment of *T. saginata*. After 'yomesan' at 05.00 and 06.00 hours, pituitrin at 07.35 hours expelled 32 segments before breakfast at 08.00 hours; an enema at 08.40 hours brought out two one-yard (1 metre) and one two-yard (2 metres) lengths of large segments. At 09.50 hours another enema brought out narrowing lengths, 6 inches (15 cm.) and less, with very small segments. At 10.00 hours a second dose of pituitrin drove him to bedpan for tug-and-tussle with 2 yards (2 metres) of large segments dangling from his prolapsed piles. Among the mucus in this collection was $\frac{1}{2}$-inch (12 mm.) of neck with scolex.

J.P., on patrol in the forests on the Aberdare mountains in Kenya in 1955, could not light fires so tried his fresh meat raw. His worm survived treatment with chloroquine, mepacrine, dichlorophen and Male Fern (twice) before meeting 'yomesan' in March, 1961. It was not till after a second dose of pituitrin at 09.00 hours and a second enema at 11.00 hours that he passed the scolex of his Mau Mau fifth columnist.

Mrs. W., age 55, had helped herself to the mince before it was cooked at a famous school. After 'yomesan' at 05.00 and 06.00 hours she was given pituitrin at 07.35 hours to aid the gastro-colic reflex after breakfast ten minutes later. She passed three segments but vomited the little milky porridge and tea she had swallowed. Cream of magnesia at 09.00 hours was vomited. A second dose of pituitrin at 10.00 hours and a second enema at 11.00 hours brought out $1\frac{1}{2}$ feet (45 cm.) of narrow segments, leaving $4\frac{1}{2}$ feet (1.4 metres) dangling and resisting a pull but delivered spontaneously later. No scolex was found, and there was a wait from April till August for certainty that it had been destroyed. Mrs. W. was ill during the treatment and that evening reported post-menopausal bleeding, blamed on a cervical polyp, perhaps roused by the treatment, removed later by the gynæcologist.

As 'yomesan' kills tapeworms, capture of the scolex is not necessary, but in hospital patients like to know that it has been caught, and there is reluctance to abandon the final ritual in the side-room where 'The pale augurs, muttering low, gaze on the blasted head'.

A PILOT TRIAL OF 'GERIDEN', IN A GERIATRIC UNIT

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One of the most common reasons for the admission of patients to a geriatric unit is mental confusion and disorientation. The theoretical causes of senile confusion have been described as: (a) acute infections, e.g. pneumonia, meningitis; (b) cerebral damage, e.g. old cerebral atheroma or thrombosis, causing softening; (c) malnutrition or dehydration; (d) acute cardiac failure, e.g. coronary thrombosis; (e) urinary obstruction; (f) psychological, e.g. loneliness. In some patients the cause can be determined fairly quickly and the confusion settles once the causative factor is removed. In many cases, however, a period of intensive investigation is needed before the cause is found. For one reason or another, there is usually a 'hard core' of elderly patients who would remain confused and noisy if they were left untreated. As recently as twelve years ago, confused elderly patients were treated at this hospital by morphine and hyoscine as a routine procedure every night. Such a course is now inconsistent with modern medical practice. Numerous sedatives have been tried over the years but all have serious disadvantages. Paraldehyde, though safe, has an unpleasant smell and causes overexcitement in small doses, and excessive drowsiness in adequate doses. The same objection may be raised to the chlorpromazine group of drugs, except for the patient who is depressed rather than confused.

'Geriden' tablets, containing leptazol 100 mg., and nicotinic acid 50 mg., have been used in the hospital for the past two years in an attempt to provide a more scientific method of treating the elderly confused patient.

Although there is said to be no increase in cerebral blood flow following the administration of nicotinic acid (Scheinberg, 1950), some benefit to the mentality of elderly patients has been thought to result (Proctor, 1957). Leptazol alone has also been employed with satisfactory results in elderly disturbed patients (Fong, 1952; Suter, 1955; Aschenbach, 1956). Levy (1953), who compared the effects of leptazol alone, nicotinic acid alone, and those of leptazol plus nicotinic acid, on the behaviour of such patients, reported that the combination of the two drugs produced a greater degree of improvement than did either drug alone. Bisley (1960) found the combination useful in general practice, but his evaluation was based on amylobarbitone as a control, and not upon leptazol alone.

METHOD

This pilot study was undertaken to compare the effects of 'geriden' tablets in elderly patients with those of control tablets containing leptazol alone (100 mg.). The tablets were identical in size and shape, and as closely similar

as possible so far as taste was concerned. Certainly the patients were not able to discern any marked difference between the tablets. Each patient received two tablets of 'geriden' twice daily for five days; then, after a short break in treatment, two control tablets twice daily for five days.

RESULTS

B1 ward.—The patients in this ward were of the type likely to be found in any geriatric ward. Among the 10 patients who received 'geriden' tablets there was no effect in eight. One patient became more alert after being apathetic, and one improved after having an unpleasant taste in her mouth due to old cerebral thrombosis. The control tablets had no effect in nine of these patients, whilst one, who complained of an unpleasant taste, became much worse and depressed. When the 'geriden' tablets were again given, the symptoms were relieved.

B2 ward.—The patients in this ward were all cases of senile dementia. Among the 11 patients who received 'geriden' tablets, excellent results were obtained in two who were able to return home. Without 'geriden' these patients were almost certifiable, and they had shown no improvement with chlorpromazine. They were not tried on leptazol alone in view of their marked improvement which permitted discharge. Three patients were less disorientated, one became definitely worse, and seven were unaffected. Of the nine patients who received the control tablets, one became more alert, whilst eight were unaffected.

DISCUSSION

These results are not dramatic but they do suggest that 'geriden' has a useful place in the psychopharmacology of a geriatric unit. Further studies would seem to be indicated. If the manufacturers were able to produce an injectable form of 'geriden' it might become a valuable drug for patients of all ages. Apart from flushing of the face no toxic effects were observed.

I am indebted to Dr. J. Wedgwood for permission to undertake this trial and my thanks are due to Denver Laboratories Ltd. for supplying the 'geriden' and the control tablets.

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GENERAL PRACTITIONERS' FORUM

ALTERNATIVE METHOD OF EXAMINATION OF THE UPPER CONJUNCTIVAL FORNIX

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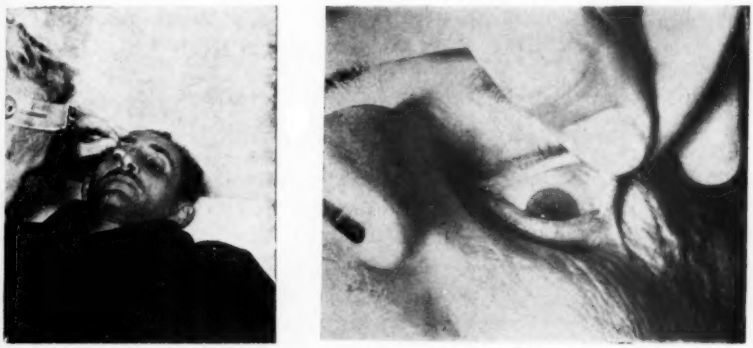
In Parsons' 'Diseases of the Eye' (12th edition, 1954), after describing the usual method of examination of the upper fornix by everting the upper eyelid and pushing the upper fornix downwards by pressure above the upper edge of the tarsal plate, the author goes on to say: 'This method



(a) (b)

Fig. 1.—Method of examining upper conjunctival fornix.

though unpleasant is not painful. The only other method of exploring the upper fornix is more effectual but also painful. The eye therefore should be well cocainized'.

The method described below may not be pleasant, but is certainly less unpleasant than the classical method and does not require cocainization. One hesitates to call such a simple technique original, but I have not been able to find any description of it in the literature.

THE METHOD

The examiner stands on the right side of the patient with his back towards the patient's feet. The patient is lying supine on the examination couch with the head flat, or even with the neck slightly hyperextended.

The skin of the centre of the upper lid is held lightly between the pulps of the left index finger and thumb. The patient is then asked to look down to his feet and the lid is pulled away from the eyeball (fig. 1a). On directing a beam of light, preferably from a headlight, which leaves the right hand free, upwards into the pouch now present, a perfect view of the con-

junctiva of the upper lid and upper fornix is obtained (fig. 1b). If not satisfied with the exposure of the inner and outer angles of the fornix, the hold on the skin of the eyelid is transferred to the inner and outer areas and the manœuvre repeated.

If it is so desired it is quite simple, by the usual 'rolling' technique, to evert the eyelid to remove any foreign body adherent to the under side of the lid. If there is a loose foreign body in the upper fornix it can be removed by syringing under direct vision.

Advantages of the method.—(i) It is painless and easy. (ii) Exposure of the upper fornix is perfect, with minimal disturbance of the anatomy of the parts. (iii) Cocainization is not necessary.

TREATMENT OF OTITIS MEDIA WITH AN ORAL ANTIBIOTIC (TRIACETYLOLEANDOMYCIN)

By P. D. FOWLER, M.B., Ch.B.
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Otitis media is a common illness, chiefly of children. Whilst treatment by penicillin injections is effective, I am of the opinion that young children should be treated by injection therapy only if: (1) there are resistant organisms, (2) there is a very severe infection, (3) in the case of vomiting or diarrhœa, or (4) there are unreliable parents.

	Age	0–7 days	7–14 days	Over 14 days	Total
Simple injection tympanic membrane	2 years	7	1	–	8
	2– 4 years	5	2	–	7
	5–12 years	2	–	–	2
	Adults	1	–	1	2
Totals		15	3	1	19
More advanced infection, e.g. bulging	2 years	–	–	–	–
	2– 4 years	5	3	–	8
	5–12 years	10	3	3	16
	Adults	1	3	–	4
Totals		16	9	3	28

Table I.—Duration of triacetyloleandomycin treatment in 19 patients with simple injection of the tympanic membrane, and 28 patients with more advanced infection.

SCOPE OF INVESTIGATION

In this investigation, which is divided into two parts, I have treated otitis media, occurring in general practice, with triacetyloleandomycin, the triacetyl ester of an antibiotic elaborated by species of *Streptomyces antibioticus*, and which has the same action as oleandomycin.

The *first series* consisted of the 61 patients, aged 7 months to 58 years, seen between December 4, 1959, and February 11, 1960. All, whether

chronic or acute, were treated with triacetyloleandomycin in the form of 'evramycin'. An attempt was made to see the patients after forty-eight hours' treatment to assess immediate response, after a further two to three days, and then again as required. The dosage was 125 mg. thrice daily for young children, 125 mg. four times daily for older children, 250 mg. thrice daily for the large ten- to eleven-year-olds, and 250 mg. four times daily for adults.

The *second series* consisted of the 80 cases of acute otitis media in children whom I saw between February 12 and May 30, 1960. Those born in odd

Age	0–7 days	7–14 days	Over 14 days
2 years	–	–	–
2– 4 years	–	1	–
5–12 years	2	2	1
Adults	1	3	–
Totals	3	6	1

TABLE II.—Duration of triacetyloleandomycin treatment in 10 patients with otitis media in whom otorrhœa was the presenting symptom.

Age	0–7 days	7–14 days	Over 14 days
2 years	–	–	–
2– 4 years	2	2	–
4–12 years	4	2	–
Adults	2	2	1
Totals	8	6	1

TABLE III.—Duration of triacetyloleandomycin treatment in 15 patients with otitis media in whom deafness was the presenting symptom.

numbered months were treated with triacetyloleandomycin and those born in even months with tetracycline in the form of 'achromycin V'. There were 40 cases treated with each preparation. The dosage of both antibiotics was the same as in the first series.

RESULTS

The results were assessed by: (1) the length of time pain persisted after starting treatment; (2) the appearance of the tympanic membrane. The patient was discharged when the tympanic membrane appeared normal or almost normal, provided the deafness did not persist.

First series.—Five cases were excluded for want of sufficient follow-up detail. Of these five, three were young children, all from families with which I have since been in contact, and would have returned if the symptoms had persisted. The other two were adults, both of unreliable nature. The results were considered satisfactory in 47 cases and poor in nine. In the satisfactory cases the pain had gone within two to three days in 41 cases and in four

days in a further five. Even in those judged to have a poor response the pain had gone within two to three days, in three out of nine cases.

Table I compares the time from original attendance to discharge in two groups classified according to the state of the tympanic membrane: (1) simple injection, (2) more advanced infection as typified by bulging tympanic membrane. This table shows, as expected, that the earlier the stage of infection at the onset of treatment the shorter is the time taken for the cure. A further interesting point is that the younger the child the earlier in the

Age (years)	Tetracycline		Triacetyloleandomycin	
	No. of patients	Failures	No. of patients	Failures
1	3	1	5	1
1– 2	10	1	10	2
2– 4	13	–	9	1
5–11	10	–	14	1
11–15	4	–	2	1
Totals	40	2	40	6

TABLE IV.—Comparison of results of treatment with tetracycline and triacetyloleandomycin in 80 children with acute otitis media.

	Under 7 days	7–14 days
Tetracycline	26	9
Triacetyloleandomycin	27	6

TABLE V.—Duration of treatment with tetracycline and triacetyloleandomycin.

stage of the illness do the parents seek treatment: e.g. in the under-5 group only 8 out of 23 had a bulging tympanic membrane, whereas in the 5 to 11 age-group 16 out of 18 had reached the more advanced stage of infection before being brought for attention. The comparable results in the 10 patients with otorrhœa are shown in table II whilst table III shows the time taken to discharge when deafness was a presenting symptom. This was similar to the results when there is more advanced infection, the time taken being considerably longer than when there is simple injection of the tympanic membrane.

The nine failures are worth individual notes. It will be seen that six of the nine had had previous attacks.

Case 1, aged 1½, had had frequent previous trouble. Although the signs and symptoms cleared in eight days, they relapsed four days later. There was a good response subsequently to tetracycline, but the infection recurred repeatedly and continued to do so after admission to hospital.

Case 2, aged 1½, still had marked injection of the tympanic membrane after seven days. It cleared slowly but incompletely with tetracycline. The child had a heavy sinus infection and was later admitted to hospital for a sinus washout.

Case 3, aged 5, still had otorrhœa after seven days' treatment. It cleared in three days with tetracycline.

Case 4, aged 8, was still in pain after five days' treatment. Both tympanic membranes were injected. The condition cleared in three days with tetracycline.

Case 5, aged 10, had had four previous attacks, and there was still bilateral deafness and injection of tympanic membranes after eleven days' treatment, when admission to hospital was arranged for repeat adenoid clearance and sinus washout.

Case 6, aged 8, had had no previous attacks. Pain and deafness were still present after nine days' treatment, but the condition responded well to tetracycline.

Case 7, aged 5, had had two previous attacks. There was still slight deafness after eight days' treatment and infection flared up again ten days after antibiotic treatment was stopped.

Case 8, aged 4, had had no previous trouble. As there was still marked deafness after nine days' treatment even though the tympanic membrane was normal, the patient was referred to the E.N.T. specialist.

Case 9, aged 4, had had frequent previous attacks. There was still pain and injected tympanic membrane after seven days' treatment. This cleared with tetracycline.

Second series.—Triacetyloleandomycin had to be discontinued in three cases: in two because the children developed diarrhœa, and the other refused

Result	Treatment	0–23/24 months		2–5 years		6–10 years		11–15 years	
		Early	Late	Early	Late	Early	Late	Early	Late
Good	Tetracycline	9	3	7	5	2	5	3	1
	Triacetyl-oleandomycin	12	–	6	7	2	5	–	1
Poor	Tetracycline	1	–	–	1	–	–	–	–
	Triacetyl-oleandomycin	2	1	–	1	–	1	–	1
Totals	Tetracycline	10	3	7	6	2	5	3	1
	Triacetyl-oleandomycin	14	1	6	8	2	6	–	2

TABLE VI.—Comparison of results of treatment with tetracycline and triacetyloleandomycin in early and late cases of acute otitis media.

to take the medicine. These are classified as poor results. One child treated with tetracycline had a concurrent hepatitis but responded well to treatment. Two children had to be excluded from the tetracycline series on account of unsatisfactory follow-up, and one from each series because the mothers gave the incorrect dosage. The cases were assessed on the same basis as in the first series. The results are summarized in table IV. In the successful cases pain was present at the second visit (two to three days after starting treatment) in three out of 35 children treated with tetracycline and in four of the 33 treated with triacetyloleandomycin.

The time taken from first attendance to discharge is shown in table V, and it can be seen that the response to treatment is very similar with the two drugs. Table VI, which compares early and late cases, shows that, although failures in both groups were few, there were more failures in the late cases treated with triacetyloleandomycin. When the failures are examined, however, it is seen that in few patients was there failure in a simple case. Both the failures with tetracycline, for example, were children aged 1½ years, who had recently had otitis media. Both responded when switched on

to triacetyloleandomycin. The details of the triacetyloleandomycin failures are as follows:—

Case 1. The antibiotic was stopped because of diarrhœa when infection was still present. The infection responded rapidly to intramuscular penicillin.

Case 2 was similar.

Case 3 was a 3-month-old baby with profuse purulent otorrhœa when first seen. This infant probably already had a mastoid infection.

Case 4 was worse after three days' treatment and responded well to penicillin.

Case 5 was a child of 10 years who had had several previous attacks of otitis media, and presented with deafness and otorrhœa. Symptoms and signs cleared quickly with tetracycline, leaving a small dry perforation.

Case 6 had deafness, and injection of tympanic membrane persisted. The child was admitted to hospital. There was a history of previous trouble and the deafness may not have been due entirely to the present infection.

CONCLUSION

It is evident from these results that both these drugs are efficient in the treatment of acute otitis media. The over-all differences in failure rates are not statistically significant, and without bacteriological control either drug could be chosen for the treatment of an acute case.

SUMMARY

Details are given of a clinical trial in general practice of the use of triacetyloleandomycin ('evramycin') and tetracycline ('achromycin V') in the treatment of otitis media.

The results suggest that both these preparations are effective in the treatment of otitis media.

Thanks are due to John Wyeth and Brother Ltd. for supplies of 'evramycin'.

THE ELECTROCARDIOGRAPH IN GENERAL PRACTICE

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There are many problems in diagnosis in general practice which cannot be solved by clinical examination alone, and one of the most important is the group of symptoms suggesting the possibility of coronary occlusion. Many patients present with symptoms which might or might not be those of coronary occlusion; few present with symptoms which make the diagnosis certain. Many middle-aged people have midriff pains with no helpful history, symptoms or signs. Some of these have had a coronary occlusion, some have not; and the differentiation is rarely possible by clinical methods only. Evans (Evans and Sutton, 1956) believes that 'if we rely on a characteristic history for the positive diagnosis of cardiac pain . . . there is one chance in three that we are wrong'.

TWO CASE RECORDS

The following two case records illustrate the problems encountered in general practice.

Case 1.—A retired agricultural labourer of 65 attended the surgery complaining of 'short wind and phlegm, and chest ache on coughing', all of which he assumed were due to a recurrence of his usual winter bronchitis. The sputum was indeed purulent, and there were a variety of added sounds in the chest. His temperature was 99° F. (37.2° C.), and his systolic blood pressure was 30 mm. Hg lower than the last record of 170 mm. three years previously. He denied chest pain on exertion or in any episode suggesting infarction; then changed his mind, and finally settled for 'it's really my wind'; a confusing story typical of such cases. An electrocardiogram showed a lateral infarct. It would not have been possible to make a diagnosis on clinical grounds alone.

Case 2.—A male clerk and storekeeper of 58, known to have had a myocardial infarction, proved by electrocardiogram nine years before, had been a psychological invalid ever since. He would interpret a whole variety of symptoms as 'another of my attacks coming on'. Our suspicions that he was trading on his past illness were aroused by the coincidence of his 'attacks' with other reasons (family or football) for wishing to be away from work. Repeated unchanged electrocardiograms were helpful in management of his case, and another also warned us when his complaints were more genuine following another coronary occlusion.

There are, of course, certain special investigations which are of value, but these all have practical disadvantages.

(1) *Estimation of serum transaminase.*—This is rarely available to general practitioners, and is of value only in the first few days.

(2) *The erythrocyte sedimentation rate* (*E.S.R.*).—This is easy for the general practitioner to do himself, but is not diagnostic, and there are difficulties in interpreting results when confused by, for example, infection or congestive heart failure, both of which are quite common in this group of patients. In general practice, too, there are often difficulties in setting up an E.S.R.; patient, doctor, E.S.R. tube, someone to read the result an hour later—all these cannot always coincide in space and time, although the use of sequestrene (Melville and Rifkind, 1960) makes this easier.

(3) *A white cell count.*—This is easier to fit into the day's round than an E.S.R. but has similar difficulties in interpretation.

As a result, many experienced general practitioners have longed for an electrocardiograph to help diagnosis in just these difficult cases (Hughes, 1958; French, 1959).

We do not know the extent of this problem and the parallel problem of patients presenting in cardiac failure or arrhythmia. Although Evans and Sutton (1956) and Price (1956) both discuss similar problems, the cases which any consultant or hospital doctor sees have usually been filtered by general practitioners and are a highly selected population statistically; any figures drawn from such cases must be viewed with caution. Hospital doctors, too, will probably be less conscious of difficulties in diagnosis as any such cases can be investigated fully there and then. To general practitioners the problem looms larger, and they are often conscious that the newly qualified, provisionally registered Houseman has diagnostic tools at his call which are denied to practically all his general practitioner colleagues, however experienced, however skilled. As a result we believe that in many such cases no clear diagnosis is made.

A TRIAL SURVEY

By noting every case seen in which a sensible house physician would quite reasonably ask for an electrocardiogram, the size of the problem was assessed. Forty cases were collected in six months, and this was thought to warrant a full-scale trial. An electrocardiograph has been in use in this practice now for over two years and our figures are taken from the second twelve months to avoid the 'backlog' and 'honeymoon period' inflation of the first few months of use. There are three partners and an N.H.S. list of about 6000, with a few hundred private patients, in an old-established partly rural, partly suburban, partly urban practice. The population is not overloaded with either young or old, and is fairly static and stable. Long-term follow-up is therefore usually possible.

In twelve months 66 electrocardiograms were taken by us on 60 patients (28 men and 32 women). Ages ranged from 40 to 86, fairly symmetrically arranged around a peak in the seventh decade (arithmetic mean 64.5 years). The main symptoms which prompted the request for the electrocardiogram were:

Pain	41
Arrhythmia	6
Heart failure	6
Collapse, shock, faints	5
Anxiety	2

In 16 cases (8 men and 8 women) there was a coronary occlusion. This underestimates the true incidence, as there are those which pass unnoticed, those who die before the diagnosis is confirmed by electrocardiogram, and those sent straight to the hospital or seen by a consultant. Of the 16 cases, only about half could have been confidently diagnosed clinically, and pain was the main symptom in only nine.

DISCUSSION

Cynics, and those sceptical of the effect of treatment on prognosis, may suggest that these figures show not much bread for such a lot of sack. Even the cynics, however, agree on the need for bed rest in the early weeks after an occlusion. If all suspects are to be kept in bed then many will suffer hardship from loss of pay and doctor-induced cardiac invalidism. If only those diagnosed clinically are kept in bed, then about half our cases of coronary occlusion are going to continue at work. Only accurate diagnosis can avoid this dilemma. If there were no way of sorting these cases accurately, then we could well say with Thurber (1945) 'You might as well fall flat on your face, as lean over too far backward', but in 1961 we must assume that any elderly patient with midriff pain or sudden onset of heart failure or arrhythmia has had a coronary occlusion until proved otherwise; and an electrocardiogram is usually the simplest solution. The few cases of coronary occlusion will not then be missed, and the much greater number of patients without occlusions will benefit perhaps most of all.

Electrocardiograms are available to most general practitioners through either a hospital outpatient consultation, or the domiciliary visit of a consultant. We believe that only a few of these cases are dealt with thus at present. If they were all passed on to the hospital service it would be swamped. Is there, in fact, any reason why general practitioners should not investigate their own patients? The following are among the objections often raised to this procedure.

(1) *Competence.*—Many seem to believe that the technique of taking a tracing is difficult. It is not. It is usually a technician's job in hospital. One standard (American) textbook on electrocardiography states that any ordinary receptionist or secretary can learn to do it in an hour or so. Maintenance of the machine is a different matter, and must be done by the makers or their agents. Learning to understand and interpret tracings is not difficult, but it is skilled work. It is no more and no less skilled than many other things a doctor learns to do. It involves no mathematics and no statistics, those two bugbears; and any competent doctor, with a little study, can extract much information from a tracing. A cardiologist will probably extract more, but this is also true of clinical examination, and the fact that a cardiologist knows more about murmurs than the rest of us does not make us give up using our stethoscopes. With practice comes greater skill and confidence in interpretation. The good doctor, in this as in all else, is the one who knows his own limitations, and who has no hesitation in seeking help when out of his depth. This type of responsibility is a familiar one to the general practitioner.

(2) *Robbing the consultants* of their domiciliary visiting fees.—This would not be worth considering if it had not been put forward quite seriously (not by a consultant). In fact, the use of the electrocardiograph does not lead to fewer consultations. It creates as well as solves problems, and we can now ask for a consultant's visit without that slightly embarrassing feeling that we are merely sending for the technician and his box.

(3) *Time.*—All this does take time, but time is saved in the management of the non-cardiac cases; and if we are not prepared to spend time on the medical care of our own patients, then what are we prepared to spend it on? As Rodgers (1960) says, talking of those general practitioners who 'did not really do very much doctoring. . . . They signed certificates, they gave them bottles of medicine, they provided them with letters to go to hospital . . . the next generation might well begin to wonder if these doctors were really necessary, and if they were worth their pay'. If we think—as most general practitioners do—that it is worth while trying to save general practice from that sort of decline, then any time spent in clinical care is well worth it.

(4) *Expense.*—Electrocardiographs are expensive. They need upkeep. A group of our size does not keep this costly machine fully occupied. Only larger group practices could manage this. Is there any reason why the National Health Service should not make it easier for those doctors who

wish to provide this service to their patients to do so? At present there are probably few general practitioners who would feel able to afford the cost.

SUMMARY

Two years' use of an electrocardiograph in general practice is discussed, and one year analysed in detail. We have found an electrocardiograph of great use in general practice. Its greatest use was in helping to rule out coronary occlusions in three-quarters of the patients examined. We would not now like to practise without it. In our opinion it is of such value to the general practitioner that its use in the National Health Service should be encouraged.

Our thanks are due to our colleagues, the consultant and registrar physicians in Norwich, for their advice and encouragement, and to Mrs. O. M. Denney for valuable secretarial assistance in preparing this article.

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HOW MUCH 'MEDICINE' IN GENERAL PRACTICE?

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General practice is often regarded as the Cinderella of medicine. Medical students look at it with some disdain and wonder why so much of their time at medical school is spent on the study of rarities if in practice they have to deal mainly with neurotics, bronchitics and 'flu's.

This survey of a small, mainly industrial practice of 1,600 patients enumerates the variety of disease entities under observation or treatment in one particular month of the year. No mention is made of prophylactic work, obstetrics, functional disorders, minor ailments or acute medical or surgical conditions. The survey includes those subacute or chronic conditions which the student normally sees in outpatient departments and illustrates the wide scope of the general practitioner's work. Of particular interest is the list of rarities which a student in his three clinical years may see only once or twice. It indicates the importance of a sound training of the undergraduate in the less common disease processes as well as the common afflictions, for a large share of the diagnosis and management of all these ailments falls upon the general practitioner. The following is a list of the various conditions for which patients were under treatment or observation in the month of December, 1960:

COMMON CONDITIONS

Gastro-intestinal tract			
Duodenal ulcer	25	Aphthous stomatitis	1
Gastric ulcer	6	Colostomy—diverticulitis	1
Fissure-in-ano	4	Carcinoma of rectum	1
Piles	1	Carcinoma of gall-bladder	1
Respiratory system			
Chronic bronchitis	12	Bronchiectasis	3
Bronchial asthma	11	Pulmonary tuberculosis	1
		Carcinoma of bronchus	1
Cardiovascular system			
Congestive heart failure	7	Paroxysmal atrial fibrillation	1
Essential hypertension	6	Paroxysmal atrial tachycardia	1
Hypertensive heart failure	1	On anticoagulants—old cardiac infarct	1
Angina pectoris	5	Intermittent claudication	1
Rheumatic heart disease (not fibrillating)	5	Fallot's tetralogy	1
Atrial fibrillation — rheumatic heart disease	4	Patent ductus arteriosus	1
Atrial fibrillation — ischæmic heart disease	6	Varicose ulcers	6
		Raynaud's disease	2
		Migraine	1
		'Abdominal migraine'	1
Central nervous system			
Hemiplegia	3	Multiple sclerosis	1
Infantile hemiplegia	3	Epilepsy—grand mal	3
Spastic child	1	Herpes zoster	1
Genito-urinary tract			
Papilloma of bladder	1	Hydrocele	1
Gynæcological conditions			
Menopausal syndrome	8	Dysmenorrhœa	2
Skin conditions			
Chronic eczema	7	Varicose eczema	3
Psoriasis	4	Alopecia areata	2
		Lichen planus	1
Ear, nose and throat			
Chronic otitis media	4	Carcinoma of antrum	1
Eye conditions			
Glaucoma	1	Iridocyclitis	1
Bone and joint conditions			
Prolapsed intervertebral disc	7	Paget's disease	1
Spondylolisthesis	1	T.B. hip	1
Chronic osteomyelitis	1	Arthroplasty of hip—osteoarthritis	1
		Ossifying chondrosarcoma	1
Metabolic diseases			
Diabetes mellitus	13	Cretinism	1
Rheumatoid arthritis	5	Thyrotoxicosis	2
Myxœdema	5	Gout	1
Psychiatric conditions			
Schizophrenia	6	Idiocy	3
Endogenous depression	2	Mongolism	1

RARER CONDITIONS

Congenital amputation of fingers	2	Hidradenitis suppurativa	1
Myasthenia gravis	2	Retrolental fibroplasia	1
Pseudohypertrophic muscular dystrophy	1	Leber's disease—hereditary optic atrophy	1
Sheehan-Simmonds's disease	1	Keratoconjunctivitis sicca	1
Cœliac disease	1	Darier's disease — dyskeratosis follicularis	1
Milroy's œdema of legs	1		

SUMMARY

An analysis is given of the nature and number of subacute and chronic conditions observed or treated in the month of December, 1960, in a general practice of 1,600 patients.

GENERAL PRACTITIONER CLINICAL TRIALS

A MULTI-ANTIBIOTIC PREPARATION IN THE TREATMENT OF DIARRHŒA AND VOMITING

'STOPTOMEX FORTIFIED' is a Danish preparation, in powder form for reconstitution with water at the time when treatment is required. Each 100 ml. of the resulting suspension then contains: streptomycin 2 g., neomycin 0.75 g., phthalylsulphathiazole 10 g., and di-iodohydroxyquinoline 2 g., together with kaolin and other non-specific constituents. It is apparent that a combination such as this will give wider antibacterial coverage than the single constituents alone. It might therefore be useful for the treatment of epidemics of diarrhœa and vomiting, when the precise etiology is unknown to the general practitioner. Although this preparation is not available in this country, many similar combination preparations are, and general practitioners may sometimes wonder to what extent they are justified in using such preparations, when there are simpler and cheaper remedies.

It was originally intended to undertake this trial in the early summer when dysentery is prevalent but, owing to delay in the receipt of supplies, the trial was not started until the autumn. The trial was designed to compare 'stoptomex' with whatever other treatment the participating doctors usually used, in alternate cases. Furthermore, should the initial treatment fail in any case, then the treatment was changed either to 'stoptomex' or to the usual drug used, depending upon which had been given first. Six members of the Group took part in this trial and a total of 103 patients was treated, female patients outnumbering male patients by 2 : 1. The cases were fairly evenly distributed throughout the different age-groups, except that there were somewhat fewer cases in the 0 to 2 years, and 61 years and over, age-groups. Initially, 'stoptomex' was given to 52 patients and other treatments to 51 patients, the age/sex distribution of these two groups being similar. Bacteriological examination of the stools was undertaken in 60 cases, but 53 of these were sterile, and it may be presumed that many of these cases were of viral origin, in view of the time of year when the trial was undertaken.

RESULTS

These are divided between the two trial periods, comprising: initial treatment, and the subsequent treatment if the initial treatment failed (table I). Initially, 'stoptomex' was given to 52 patients, in 42 of whom the condition resolved rapidly in an average time of 2.8 days. There were 10 failures, all

of which subsequently responded to alternative treatments in an average time of 4.4 days. The majority of these latter treatments were only symptomatic. In the other initial treatment group, when other remedies were employed, 51 patients were treated, with resolution in 44 in an average time of three days. Again the majority of these other treatments were purely symptomatic. In the seven cases which failed to resolve with the other treatments, six subsequently resolved with 'stoptomex' in an average time of four days, but one still failed to resolve with this treatment.

Side-effects were virtually non-existent and occurred in only 5 per cent. of the patients. The most usual dose of 'stoptomex' employed was 15 to

Treatment	Initial treatment			Subsequent treatment		
	No. of cases resolving	Average time to resolve (days)	No. of failures	No. of cases resolving	Average time to resolve (days)	No. of failures
'Stoptomex'	42	2.8	10	6	4.0	1
None	4	1.2	1	—	—	—
Symptomatic	25	3.6	4	8	4.7	0
Soluble sulphonamide	4	5.0	0	—	—	—
Insoluble sulphonamide	3	1.3	1	1	3.0	0
Chloramphenicol	1	—	1	—	—	—
Streptomycin and sulphonamide	7	1.7	0	1	3.0	0
All others together	44	3.0	7	10	4.4	1

TABLE I.—Results obtained with 'stoptomex' and other preparations in treatment of cases of diarrhœa and vomiting.

30 ml. four times a day, and the dosage did not appear to influence the results. This means that one bottle of the suspension would only last for one to two days' treatment. There was some difficulty in suspending the mixture in water, since there was a tendency for solid aggregates to form, which required considerable shaking for dissolution. Generally speaking, the patients found the preparation somewhat unpalatable.

CONCLUSIONS

It may be concluded that in this trial, 'stoptomex' was not shown to be superior to the other remedies normally employed by the participating doctors. In view of the fact that very often the latter consisted only of symptomatic treatment, there would seem to be little justification for using a combination of powerful antibiotics, such as is contained in 'stoptomex', in these common cases of diarrhœa and sickness, seen in general practice. On the other hand, as it is apparent that there was little evidence that the cases treated in this trial were due to bacterial infection, it cannot be said that this trial represents a fair assessment of 'stoptomex' in the treatment of diarrhœa and sickness of bacterial origin. This would only have

been possible if the material had been available for trial in the early summer.

The following doctors took part in this investigation:—
Dr. June Alexander, North Ferriby, Yorkshire
Dr. M. E. M. Cook, Exeter, Devon
Dr. D. C. Morrell, Hoddesdon, Hertfordshire
Dr. D. F. Parkin, Guildford, Surrey
Dr. E. M. Sklar, Willesden, London, N.W.10
Dr. David Wheatley, Twickenham, Middlesex
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CHLORMEZANONE IN FIBROSITIS AND DYSMENORRHŒA

CHLORMEZANONE ('trancopal') is a skeletal muscle relaxant with, in addition, tranquillizing properties. Chlormezanone is combined with paracetamol in the preparation 'lobak', which is advocated for the treatment of non-articular rheumatism (fibrositis) and dysmenorrhœa.

SCOPE OF INVESTIGATION

This trial was undertaken by four general practitioners to assess the effectiveness of chlormezanone in these two conditions under 'double blind' conditions. Either active or placebo tablets were alternated over three consecutive two-weekly periods in cases of fibrositis, and over three separate menstrual periods in cases of dysmenorrhœa. In the fibrositis cases, treatment in the third fortnightly period was with whichever tablet had proved more effective in the first two periods of the trial. In the dysmenorrhœa cases, however, if the first tablet given produced a beneficial effect, this was continued for the second and third menstrual periods, and only changed if the effect in the first period had been inadequate. It was felt necessary to do this in the dysmenorrhœa cases, because it would not have been ethical to deny such patients effective treatment for their symptoms. In both parts of the trial therefore the patients acted as their own controls, with the added advantage of a third confirmatory period. In addition, the order of giving either the active or placebo tablet first was alternated from patient to patient. Neither the doctors nor the patients knew which tablet was which. The usual dose used was 200 mg. thrice daily, being increased if necessary to obtain the optimal effect.

FIBROSITIS

The trial was restricted to patients with symptoms of at least three weeks' duration, and a total of 34 was treated, the two commonest sites involved being the cervico-scapular and lumbar regions. Virtually the same numbers of men and women participated, and the maximum incidence in both sexes was in the 31-60 years age-group. All the patients with the exception of 3

(9 per cent.) had previously been treated by one or more methods, as shown in table I, where the effectiveness of such treatments is indicated as: + = complete relief of symptoms, ± = partial relief of symptoms and — = no relief of symptoms.

The results in the present trial are shown in table II. It is apparent that considerably better results were obtained with the active tablet than with

Previous treatment	No. of times used and results		
	+	±	—
Analgesics	2	16	11
Vasodilators	1	2	1
Local rubefacients	–	1	–
Totals	3 (9%)	19 (56%)	12 (35%)

TABLE I.—Results of previous forms of therapy in 34 patients subsequently treated with chlormezanone.

the placebo, and this is reflected in the fact that more than twice the number of patients were treated with the active tablet as with the placebo in the last two weeks of the trial when there was a free choice of tablet, depending

	Tablet A (placebo)				Tablet B (active)			
	+	±	—	No. of cases	+	±	—	No. of cases
1st 2 weeks	1	4	14	19	6	8	1	15
2nd 2 weeks	3	2	9	14	3	6	7	16
3rd 2 weeks	3	1	2	6	6	5	4	15
Totals	7 (18%)	7 (18%)	25 (64%)	39	15 (33%)	19 (41%)	12 (26%)	46

TABLE II.—Results obtained with chlormezanone in 34 patients with fibrositis.

upon the results obtained in the first two periods of the trial. There were fewer patients in the last two weeks of the trial, as some omitted treatment either because their symptoms were better, or were not better, or because side-effects had occurred.

DYSMENORRHŒA

Twenty-five women were treated, and the maximum incidence was in the 21-30 years age-group in married women. The majority of these patients had had symptoms for between three and twenty years, and 72 per cent. of them suffered from premenstrual as well as menstrual pain. In the majority, pain persisted for between five and ten days, and more than half of the patients studied were actually incapacitated by the pain, although usually this only necessitated one day off work or in bed. All but three of these patients had been treated previously, mainly with analgesics of the aspirin type. These previous treatments had resulted in a 19 per cent.

complete relief of symptoms, and 70 per cent. partial relief of symptoms, whilst 11 per cent. had obtained no relief of symptoms.

The results in the present trial are shown in table III. In the first trial period it is seen that an almost equal number of patients were treated with active and placebo tablets, but that in the second period of the trial twice as many patients were treated with the active tablet as with the placebo, whilst in the third period of the trial this proportion rose to almost 3:1 in favour of the active tablet. As in the case of the first part of the trial, before the

	Tablet A (placebo)				Tablet B (active)			
	+	±	—	No. of cases	+	±	—	No. of cases
1st month	1	1	11	13	2	4	6	12
2nd month	1	1	5	7	9	5	1	15
3rd month	1	1	3	5	8	3	3	14
Totals	3 (12%)	3 (12%)	19 (76%)	25	19 (46%)	12 (29%)	10 (25%)	41

TABLE III.—Results of treatment with chlormezanone in 25 patients with dysmenorrhœa.

identity of the tablets was known, this suggested that tablet B was the active tablet, since in this part of the trial there was a free choice of tablets in the second and third months. It is also apparent that the results obtained in the second month with the active tablets have been sustained and confirmed in the third monthly period of the trial. These results compare more than favourably with the results obtained with the previous treatments.

The incidence of side-effects was virtually the same with the active and placebo tablets, and between 83 per cent. and 90 per cent. of patients taking the active tablets experienced no side-effects at all. Only one patient taking the placebo tablet and one patient taking the active tablet had to omit treatment because of side-effects.

CONCLUSIONS

It was concluded that this trial has shown that chlormezanone has a definite therapeutic effect, as compared with an inactive placebo, in the treatment of both non-articular rheumatism and dysmenorrhœa. It was the general feeling of the participating doctors, however, that the effect in fibrositis was not sufficiently good *per se* to warrant making chlormezanone their drug of choice, although it might well have a place in the treatment of dysmenorrhœa. It would seem to be a logical procedure to combine chlormezanone with an analgesic for the treatment of these conditions.

The following doctors took part in this investigation:—
Dr. D. Clynes, Salford, Lancashire
Dr. R. Parker, Swansea
Dr. B. Taylor, Hackney, London, E.9
Dr. D. Wheatley, Twickenham, Middlesex

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CURRENT THERAPEUTICS

CLXVII.—THE SEX HORMONES IN OBSTETRICS AND GYNÆCOLOGY THEIR USES AND LIMITATIONS IN GENERAL PRACTICE

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THE sex hormones are widely employed in the fields of obstetrics and gynæcology. That is not to say that there are many conditions in which their value is proved beyond doubt. On the contrary, the absolute indications for their use are relatively few, especially in general practice. The increasing availability of potent preparations, however, especially for oral use, has led to a greater employment of the sex hormones, sometimes unwisely. Side-effects, often unpleasant for the patient or worrying to the doctor, are not uncommon. These may be due to overdosage or overprolonged administration, but they may also occur during properly controlled treatment. This is because sensitivity to the same hormone varies not only from individual to individual, but also in different target organs in the same individual.

For present purposes the ovarian hormones, the gonadotrophic hormones of the anterior pituitary gland and androgenic hormones will be discussed.

ŒSTROGENS

Œstrogens are usually prescribed orally in the form of stilbœstrol or ethinylœstradiol. The standard tablet of the former is of 1 mg., and of the latter of 0.05 mg. Weight for weight ethinylœstradiol is ten to fifty times as strong as stilbœstrol. This wide range of relative strength emphasizes that for different purposes different œstrogenic preparations have different potency.

ŒSTROGENS IN OBSTETRICS

In obstetrics there is only one incontrovertible indication for the use of œstrogens and that is the *inhibition of lactation*. Ethinylœstradiol is given in the form of three 0.05-mg. tablets thrice daily on the first two days, two tablets thrice daily on the third and fourth days, and one tablet thrice daily on the fifth and sixth days. There is no advantage in starting the course of treatment with an injection of a larger dose of œstrogen. Œstrogens are less effective in *suppressing lactation* once established, but the same course may be given. One or two tablets of ethinylœstradiol, 0.05 mg., are given by some for engorgement of the breasts, but spontaneous cure of this condition is so common that it is almost impossible to assess the value of œstrogens for this purpose.

Œstrogens have for many years been prescribed to procure the expulsion

of a *missed abortion or missed labour* after death of the fœtus, but controlled clinical experiments have shown that they have no specific value for this purpose. Œstrogens will not produce abortion of a living pregnancy. On the contrary, they have been advised, alone or in combination with progestogens, for the treatment of both *threatened and habitual abortion.* Similarly, treatment with œstrogens, with or without progestogens, has been claimed to diminish the incidence of toxæmia and increase the fœtal salvage rate in *pregnant diabetics.* Controlled trials have not confirmed this claim; it is the close supervision of the diabetic state which is the major factor in the outcome of these pregnancies. It has also been claimed that the routine administration of increasing doses of stilbœstrol from early pregnancy to the 35th week decreases the incidence of many *complications of pregnancy*, from abortion and prematurity to toxæmia. All these claims are still unproved, as is the once popular view that œstrogens are effective in the prevention and treatment of *uterine inertia.*

According to our present knowledge there is no apparent danger from the use or abuse of œstrogens in the pregnant or newly delivered patient, for such women tolerate massive doses without manifesting untoward signs or symptoms.

ŒSTROGENS IN GYNÆCOLOGY

In gynæcology there are few conditions for which œstrogens have not at one time or other been advocated. Œstrogen is the hormone of genital growth and therefore it is commonly used in *genital hypoplasia.* This condition is not easily diagnosed for certain although it is often presumed in sterility; but when suspected it can be treated cyclically with œstrogens, alone or together with progestogens. Stilbœstrol, 1 to 3 mg., is given daily for twenty-one consecutive days, during the last ten days of which 5 mg. of an oral progestogen may also be prescribed daily. This treatment is continued for three or four cycles, starting the tablets on the third day of the period.

In amenorrhœa œstrogens are more useful for diagnostic than for therapeutic purposes: that is, in order to ascertain whether the uterus is responsive to the ovarian hormones. In *primary* amenorrhœa cyclical administration of œstrogens may produce withdrawal bleedings but rarely results in a permanent cure. In *secondary* amenorrhœa, however, especially if not of long standing, 0.15 to 0.3 mg. of ethinylœstradiol daily for twenty-one consecutive days out of twenty-eight for three cycles may be followed by the spontaneous resumption of normal, and even ovular, menstruation. A shorter form of treatment in secondary amenorrhœa is to give orally for two or three days a combination of œstrogen and progestogen: e.g. ethinylœstradiol, 0.05 mg., with norethisterone acetate, 5 mg., twice daily. This shorter form of treatment is commonly used as a rapid and easy *pregnancy test* and is fairly accurate in the absence of any gross endocrine disorder. Absence of subsequent withdrawal bleeding within three days is probably

due to pregnancy. The practitioner who prescribes these tablets (e.g. 'primodos'), however, is advised to state their purpose and emphasize that they are not abortifacient; otherwise his patient may tell her friends whom to consult when a period is alarmingly overdue! At all times it should be remembered that as amenorrhœa is merely a symptom, a primary cause, local or general, must be sought; and the commonest cause of secondary amenorrhœa is pregnancy, whatever story the patient may tell.

Œstrogens have been used in the treatment of *primary spasmodic dysmenorrhœa*, the effect being by suppressing ovulation. Today progestogens are more commonly used for this purpose, as detailed on p. 704. Similarly, œstrogens have been prescribed for the relief of *endometriosis*, a cause of *secondary dysmenorrhœa*, but the massive doses required cause such unpleasant side-effects and the relief is so often only temporary that this therapy, never popular, has been generally abandoned.

The value, if any, of œstrogens in *sterility* is still unproved. They have been variously advocated when the infertility is considered due to hypoplasia of the uterus, to anovulation, to a thick cervical mucus, and to a subnormal luteal activity preventing satisfactory embedding of the fertilized ovum. The practitioner is probably best advised to await full confirmation of the value of œstrogens for any of these purposes before embarking on such therapy.

In *functional uterine hæmorrhage* the hæmostatic action of œstrogens is fairly well established although the exact mechanism of their action is still debated. *When an organic cause has been excluded*, or *in an emergency*, the bleeding can be controlled by giving stilbœstrol, 5 mg. eight-hourly, until the bleeding stops—usually within twenty-four hours. Stilbœstrol, 3 mg. daily, is then prescribed for twenty-one days, and four or five days after the end of this course a 'withdrawal bleeding' will start. On the third day of this bleeding stilbœstrol is restarted in 2-mg. daily dosage for twenty-one days. In the third artificial cycle the daily dose is reduced to 1 mg., again starting on the third day of the period. Subsequently normal menstruation may be spontaneously resumed. If not, then specialist advice should be sought, for it is surprising how many cases of 'functional' bleeding are eventually found to have an organic basis. Some prefer to use one of the newer powerful oral progestogens to control and regulate the metropathic episodes of functional uterine bleeding. A single 20-mg. dose of a norethisterone usually stops the vaginal bleeding; if not, then 30 mg. are given twenty-four hours later. Once hæmostasis has been induced, 5 mg. are given daily for twenty days, and similar twenty-day courses are repeated starting on the fifth days of the next two cycles.

A warning note should be sounded here. Functional bleeding is most common towards the extremes of menstrual life. In the juvenile type, in which thyroid tablets B.P. (1 grain [60 mg.] daily) are very useful, hormonal treatment may be employed empirically, but if the condition persists or recurs full blood examination (to exclude, for example, thrombocytopenic

purpura) is indicated, as well as endometrial biopsy and culture to exclude genital tuberculosis. On the other hand, in women over 35 the first step, before resorting to hormones except as an emergency measure, should be a full gynæcological examination including curettage.

In *infantile vulvo-vaginitis* œstrogens are less commonly used since the introduction of antibiotics. If they are given, a suitable dose is stilbœstrol, 0.5 mg. daily for five days, and then on alternate days for a further five doses. In persistent or recurrent cases the cause may be sensitivity to wool knickers or their dye (a change to white cotton pants will soon prove this point), or there may be a small foreign body in the vagina.

ŒSTROGENS AT THE MENOPAUSE

Menopausal symptoms are a common indication for the use, and misuse, of œstrogens. The wise physician will use as his first line of treatment adequate explanation of the cause and significance of these symptoms, and back this up with reassurance and, perhaps, a mild sedative. Probably in less than 10 per cent. of women with menopausal symptoms is there need to prescribe œstrogens. When the latter are employed, side-effects troublesome to the patient and irregular bleeding worrisome to the doctor can be avoided by adherence to certain general rules:—

(1) Do not impute symptoms to the menopause merely because of the woman's age.

(2) Do not give œstrogens if the woman is still having periods.

(3) Start with a small dose, e.g. stilbœstrol 0.5 mg. daily, and increase, if necessary, to the smallest dose that just *fails* to relieve the symptoms completely. In this way overdosage is avoided.

(4) Give the œstrogens cyclically: that is, for twenty-one consecutive days out of twenty-eight.

(5) Gradually taper off the dose over three to four months.

(6) If during or following the hormone therapy there is any bleeding, this must not be presumed consequential but the patient should be referred for a full gynæcological examination.

Tablets of mixed œstrogens and androgens (e.g. 'mixogen', 'mepilin') are sometimes advocated for the relief of menopausal symptoms. Theoretically the œstrogens give relief and at the same time prevent any virilizing effect by the androgens; the latter, in turn, prevent any undue stimulation of endometrium and breasts while acting as a tonic by virtue of their anabolic effect. Unfortunately this mixed therapy may in practice manifest side-effects of both hormones, with both hirsuties and uterine bleeding following. Chlorotrianisene is said to give a prolonged œstrogenic effect because it is stored in the body fat from which it is slowly released. The drawback is that if uterine bleeding does occur due to this form of therapy, control of the hormone is lost as it cannot be reclaimed. A more precise control is obtained by giving a simple œstrogen on the lines indicated above.

The same rules should be observed when *senile vaginitis* or *kraurosis vulvæ* is treated with œstrogens.

The abuse of œstrogen therapy is most often seen at or after the menopause. Indeed, œstrogen medication is now one of the commoner causes of post-

menopausal bleeding. In some cases, however, the fault lies not in the dosage or in over-long administration, but in the undue sensitivity of the patient to the hormone. Thus, post-menopausal bleeding has followed the use of skin creams containing very small amounts of œstrogens (e.g. 'menopax cream'). It is advisable therefore to avoid œstrogen therapy unless there is a well-established indication. In particular, such treatment is best avoided in leukoplakia vulvæ, in pruritus vulvæ (which is merely a symptom, the cause of which must be sought), and when an artificial menopause has been induced surgically or radiotherapeutically for a condition activated by œstrogen, such as endometriosis. It is also inadvisable to prescribe œstrogens to relieve menopausal symptoms in women treated for malignant disease of the genital tract or breast, although there is no certain evidence that œstrogen medication can cause such cancers. In such women vitamin E in large dosage (100 to 500 mg. daily for a month) may be tried instead.

PROGESTOGENS

If œstrogen is the hormone of genital growth, then progestogen is the hormone of genital function. And just as a certain amount of growth is a prerequisite to ability to function, so progestogens have no action on the uterus which is not primed by œstrogens. The two hormones are complementary, not antagonistic. The natural progesterone must be given by injection or by implantation. Until recently the only oral analogue available was ethisterone, but this has only one-tenth to one-fifteenth the potency of the same amount of progesterone given by injection. Within the last few years, however, a series of powerful oral progestogens have been produced by the steroid chemists. Most are nortestosterone derivatives (norethisterones), e.g. 'primolut N', 'secrosteron'; and 'enavid' which also contains a small amount of œstrogen. The standard dose of all is 5 to 10 mg. daily.

PROGESTOGENS IN OBSTETRICS

Progestogens are commonly used in *threatened abortion*, allegedly as a uterine sedative. Progesterone, however, has two opposing actions: it encourages retention of a pregnancy by promoting a favourable nutritional environment for the embryo, and it causes uterine contractions which are less frequent but of greater amplitude. The fœtal salvage rate is about the same whether *all* cases of threatened abortion or *none* are treated with progestogens. The hormone is probably best withheld unless the urinary excretion rate of pregnanediol, the main urinary metabolite of progesterone, can be determined and is low. Certainly progestogens cannot be expected to save most early abortions, for the commonest cause of these is some error of development of embryo or trophoblast. If progestogens are indicated, then 20 to 30 mg. of an oral norethisterone are given daily for not more than four weeks.

Pregnanediol excretion tests also suggest that progesterone failure is a far from common cause of *habitual abortion*, and progestogens should be withheld unless the excretion rate is low for the stage of pregnancy.

Progestogens are less favoured now in the treatment of complications of pregnancy, since a number of cases have been reported in which the prolonged use of this hormone (as well as of androgens) has resulted in virilization of the fœtus if female, so that the baby is born with features of a female pseudohermaphrodite. It is claimed that allylœstrenol ('gestanin') is free from this androgenic effect; if so, it is presumably because it is a less potent progestogen than the other new synthetic preparations.

After delivery, progestogens in 10-mg. dosage sometimes seem to relieve *after-pains*, but these often respond well to simple analgesics.

PROGESTOGENS IN GYNÆCOLOGY

In gynæcology the progestogens have become much more widely employed since the oral norethisterones were introduced. Their use, however, is sometimes associated with side-effects which may deter the patient from continuing with them—notably nausea, vomiting, dizziness, mastalgia and headaches. Often these side-effects disappear if the hormone is persisted with. One other effect that must be mentioned, and it is advisable to warn the patient of this, too, is that the onset of a period after progestogen therapy may be delayed for up to a week.

This effect is made use of on the rare occasions when it is desirable to *postpone the onset of a period.* If 10 mg. are given daily starting at least five days before the period is due, menstruation will not start until at least three days after the hormone is discontinued. If progestogens are started sufficiently early in the menstrual cycle, *ovulation is suppressed.* The newer oral preparations have therefore been used for *contraception* with reported high degree of efficacy. Trials have recently been begun in Britain, but it will be a long time before one will be able to state for certain that the prolonged use of progestogens for this purpose has no adverse effect on the uterus or breasts. Certainly the suppression of ovulation seems to be limited to the cycles of administration. The dose recommended is 5 to 10 mg. daily from the 5th to the 24th days of the cycle.

Primary spasmodic dysmenorrhœa occurs only in ovular cycles and therefore can be obviated by suppressing ovulation. This is done by giving progestogens as noted above for three consecutive cycles. In about 80 per cent. of patients the dysmenorrhœa does not recur thereafter when the hormone is discontinued. The effect of suppressing ovulation can therefore also be used as a diagnostic method to distinguish primary or 'essential' dysmenorrhœa from that secondary to local disease or of psychosomatic origin. Because *endometriosis* is favourably influenced by pregnancy but only a minority of women with this condition conceive, it seemed logical to try the effect of a 'pseudopregnancy' such as can be induced by prolonged progestogen therapy. 'Enavid' has been given in dosage increasing from 2.5 mg. daily the first week to 20 mg. daily the fourth week; and this last dose is continued for twenty-two to twenty-six weeks so that the total duration of the course is over seven months. First reported results of this

regime are encouraging but it is not yet sufficiently well established to be recommended for use in general practice.

Progestogens have also been used for some years in the management of the ***premenstrual tension state***, a syndrome imputed to hyperœstrinism. The symptoms, which appear seven to ten days before the onset of the period and abate dramatically with the start of the menstrual flow, include irritability, insomnia, mastalgia, pelvic discomfort and a feeling of abdominal bloating. As there is an associated retention of fluid it does not seem logical to prescribe progestogens which themselves favour fluid retention. Yet often a daily dose of 5 mg. of norethisterone over the last seven to ten days of the cycle is remarkably effective, especially if reinforced by an oral diuretic. Nevertheless, it should be remembered that the onset of this syndrome is usually related to some social or marital upset or frustration, and in most cases investigation, explanation and reassurance from this point of view form the first line of treatment.

Reference has already been made to the use of progestogens in functional uterine hæmorrhage, uterine hypoplasia, and amenorrhœa. At present in general practice progestogens are of major value in functional uterine bleeding when organic disease has been excluded, and in primary spasmodic dysmenorrhœa, and have a place in the treatment of threatened or habitual abortion if there is evidence of progesterone deficiency.

GONADOTROPHINS

These hormones are secreted by the anterior pituitary but the preparations we use are not obtained from that source. Follicle-stimulating hormone (FSH) is extracted from the serum of pregnant mares and is therefore called equine or serum gonadotrophin ('gestyl, 'gonadotraphon FSH'). It has been employed in amenorrhœa and in sterility due to anovulation, but results are poor and severe reactions, probably from protein impurities, may follow its repeated injection. For luteinizing hormone (LH) an extract is made from pregnancy urine as this contains a luteinizing or luteotrophic factor derived from the chorion and therefore called chorionic gonadotrophin ('pregnyl', 'gonan', 'gonadyl', 'gonadotraphon LH'). This has been used for functional uterine hæmorrhage, in conjunction with serum gonadotrophin for anovulation, and in combination with 'an anterior pituitary synergic factor' for amenorrhœa and sterility. In all the results are poor.

In gynæcology and obstetrics therefore gonadotrophin therapy has nothing to offer the general practitioner.

ANDROGENS

Androgenic hormone has entered the field of gynæcology within the last twenty years, but many are averse to using it at all in the female as unphysiological. The effect on the female varies with the dose, but progressively it neutralizes œstrogens, inactivates the ovaries, partly inactivates the anterior pituitary, and produces masculinization—hirsuties of the male

type, deepening of the voice, enlargement of the clitoris and acne. Tolerance to the hormone varies from woman to woman and is greater in women over 40, but generally more than 150 mg. of testosterone propionate by injection, or more than 400 mg. of methyltestosterone by mouth, in a month involves some risk of masculinization. Testosterone propionate must be injected; methyltestosterone, which has only about one-quarter of the potency of the propionate weight for weight, comes in tablets for *sublingual* absorption.

Androgens have been used for the treatment of *functional uterine bleeding* by virtue of their depressant effect on the ovaries, but there is little place for them in this disorder since the introduction of potent oral progestogens. The use of androgens combined with œstrogens to relieve *menopausal symptoms* has already been discussed: œstrogens alone are as effective and less likely to cause undesirable side-effects. On the other hand, androgens are of value in *endometriosis*. For treatment the anti-œstrogenic effect is no more than palliative, but when the condition is suspected rather than proved, androgens can be used as a therapeutic test. If the symptoms are relieved by 5 to 10 mg. of methyltestosterone sublingually daily for a month, then the tentative diagnosis of endometriosis is confirmed.

In sexual *frigidity* in the female a nightly dose of 10 mg. of methyltestosterone sublingually for four to six weeks is often helpful. This may be because the hormone increases the sensitivity of the clitoris or enhances response to psychic stimuli, but the exact mechanism is not known for certain and it may be the 'sales-talk' with which the prescription is accompanied that is the most potent factor.

Testosterone has been tried in a variety of other conditions from dysmenorrhœa to hyperemesis gravidarum, to suppress lactation and in the treatment of premature babies, but its value in these conditions is unproved and it should not be so employed in general practice.

Whenever androgens are prescribed for a woman in whatever dosage, a careful watch is kept for the development of features of masculinization, the supervention of which is an indication to discontinue the hormone.

CONCLUSION

In summary, the clear-cut indications for sex hormone therapy in obstetrics and gynæcology are relatively few, especially in general practice. The practitioner is advised to treat claims of efficacy in other conditions with due scepticism and at all times to supervise closely any woman for whom he has prescribed sex hormone therapy.

CALLING THE LABORATORY

XXIII.—CHEMICAL TESTS FOR ALCOHOLIC INTOXICATION

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It must be stressed in the first instance that no chemical test can give other than an indication of the amount of alcohol circulating in the body, which, in its turn, gives an indication of the minimum amount of alcohol consumed. The significance of the figure can only be assessed in conjunction with all the other relevant findings—clinical and statistical.

The most common occasion on which a medical practitioner will be expected to reach a conclusion as to whether a person is intoxicated or not will be when an accident or some other incident has aroused the suspicions of the police, and they require a medical opinion for the purpose of a charge being preferred. In such circumstances, the practitioner will have to arrive at a decision whether or not the person is intoxicated without any scientific help and, after excluding natural disease, await the result of the tests (blood, urine or expired air), to assist in the confirmation of his opinion.

As the law stands at present, the presence of even a fairly large quantity of alcohol in the blood and urine does not necessarily convict the accused of the offence. It is only in those countries which have taken the bull by the horns and made a law that if a person drinks more than a certain quantity of alcohol *and* drives, that he is automatically convicted if the blood content of alcohol indicates a consumption of more than the legal limit. Such a conviction is automatic on production of an analytical report from an approved laboratory.

All these arguments do not mean that a chemical estimation for alcohol is valueless: on the contrary, it could show, for instance, that the accused person had not taken any alcohol at all.

BLOOD TEST

The material which can be used for the analysis is blood or urine. Blood has certain advantages in so much as the amount of alcohol detected does represent the amount circulating at the time when the blood was taken—but not, it should be noted, how much was present at the time of any incident. Blood, however, has one disadvantage: it has to be collected. In this country this is usually done from a vein, whilst in Scandinavia it is collected as capillary blood by pricking the ear. Both these operations require the consent of the person, with clear indication for the reason for it, and neither method may be wholly satisfactory when carried out on an erratic subject (especially if intoxicated); this, however, will depend upon the skill of the operator.

In either event, it is obvious that the skin must not be cleaned with alcohol or spirit, nor must the syringe or needle have been in contact with alcohol. Probably one of the best methods is to use a non-alcoholic antiseptic and the 'venule'. An anticoagulant such as sodium fluoride may be used. After collection, the blood sample should be sealed and labelled and, if possible, a portion should be handed to the accused. If delay is likely to occur before delivery to the laboratory, then it should be stored in a refrigerator but in a sealed labelled container.

URINARY TEST

An easier alternative material for examination is the urine. This, however, requires the cooperation of the accused and it is most improper to attempt to obtain it by a trick. It should be collected by asking the person to pass it into a wide-mouthed chemically clean container which can contain a small amount of approved preservative: e.g. phenyl mercuric nitrate, 0.1 per cent. It is then divided into three samples in separate chemically clean containers which are sealed and labelled, and one is handed to the accused. Again, if delay is likely to occur the samples should be stored in a refrigerator in a sealed package. Although the amount of alcohol in the urine will never exceed the figure of maximum absorption, it is advisable to collect two samples of urine, the second being after an interval since previous voiding. If time has allowed the tissues to get into equilibrium, the resultant figure will then represent the same figure as the blood at the time in the ratio of 4 : 3.

In interpreting the results of urine analysis, allowance must be made for the length of time since drinking and last emptying the bladder and, although it is said that the urine figure cannot exceed the blood figure owing to resorption from the bladder, there is doubt in the minds of many as to what extent this can occur. It should always be remembered that alcohol is a diuretic and hence the bladder is usually emptied quite often. On the other hand, it is possible that a person may have unusual bladder control and the figure may represent ingestion of alcohol early in the day. As the interpretation of the figures will be discussed later, it is convenient to mention at this stage that if either of these samples is collected, it will take a laboratory some time to do the analysis and hence, as already mentioned, the practitioner will receive no help at the time of his examination.

EXPIRED AIR ANALYSIS

To obviate the wait involved in the use of blood and urine, the analysis of expired air, which has the same alcohol content as blood, has been adopted in some countries. There are several apparatus available which are known by such names as the 'breathalyser', 'drunkometer' (Harger), 'intoximeter' (Forrester), 'alcometer', and they have been greatly improved recently. They all involve breathing into a bag or special tube and the result is measured by passing the breath through a machine which will indicate the amount of alcohol present.

It has been stated that the results obtained by the 'breathalyser' in skilled hands are comparable with those obtained from blood by competent chemists *but* one serious potential disadvantage lies in the fact that it is possible to alter results by manipulation.

Details of the techniques for alcohol estimation recommended by a

Urine result (mg./100 ml.)	Intake (pints)	Urine result (mg./100 ml.)	Intake (pints)
24	½	367	7½
49	1	391	8
73	1½	416	8½
97	2	439	9
123	2½	464	9½
147	3	488	10
171	3½	513	10½
196	4	537	11
220	4½	561	11½
244	5	587	12
268	5½	611	12½
293	6	635	13
317	6½	660	13½
343	7	684	14

TABLE I.—Minimum intake of ordinary beer or stout as calculated from the alcohol found in the urine. (For a male of body weight of 154 pounds and assuming average alcohol content, i.e. 14.7 g. per pint.)
(Adapted from 'The Recognition of Intoxication', British Medical Association, 1954).

Urine result (mg./100 ml.)	Whisky* (fluid ounces)	Urine result (mg./100 ml.)	Whisky* (fluid ounces)
30	1	420	14
60	2	450	15
90	3	480	16
120	4	510	17
150	5	540	18
180	6	570	19
210	7	600	20
240	8	630	21
270	9	660	22
300	10	690	23
330	11	720	24
360	12	750	25
390	13	780	26
400	13⅓ (=⅓ bottle)	800	26⅔ (=1 bottle)

* 1 whisky = approximately ⅔ fluid ounce
* 1 double whisky = approximately 1⅓ fluid ounce

TABLE II.—Minimum whisky or gin intake as calculated from the alcohol found in the urine. (For a male of body weight of 154 pounds and assuming average alcohol content, i.e. 8.98 g. per fluid ounce.)
(Adapted from 'The Recognition of Intoxication', British Medical Association, 1954.)

panel of the Royal Institute of Chemistry are to be found in the report on 'The Recognition of Intoxication' published by the British Medical Association (1954), which also outlines the procedure to be adopted in the clinical examination. A point stressed by this panel was that testing should

be carried out only in officially recognized laboratories experienced in this work.

INTERPRETATION OF RESULTS

The interpretation of results is admirably summarized in tables I and II, which are reproduced from the report on 'The Recognition of Intoxication'. When interpreting from these tables, certain facts should be noted.

(1) They are based on the minimum amount of alcohol circulating in the body and hence do not necessarily mean the total amount drunk. This does not take into consideration any unabsorbed alcohol in the stomach.

(2) The figures for beer relate to ordinary-quality beers not high-quality beers.

(3) The figures given are for a male weighing 154 pounds. If the exact weight is known, it should be corrected by multiplying the final figure in pints or ounces by the body weight in pounds and dividing by 154.

(4) In the case of a female, all results in pints and ounces must be multiplied by 3/5 or, if corrected from body weight, by 5/6.

(5) If blood alcohol figures are used instead of urine, then the result in pints and ounces must be multiplied by 4/3.

In cases in which a medical practitioner may be called upon to give evidence as to the clinical condition of an accused person, he will be well advised to steer clear of the technical aspects of the analysis and leave such matters to an analytical chemist. On the other hand, there are clearly certain matters upon which he may be expected to give an opinion because of his medical knowledge. Among these will be his views on such controversial matters as whether every person is affected in the same way by the same amount of alcohol, whether chronic alcoholics can develop a tolerance —it may be they also develop an 'awareness'—or whether alcohol potentiates barbiturates (it is an additive effect). Before attempting to answer such questions, the practitioner should be well acquainted with the literature on the subject and be prepared to support his own views, or merely be content to say that the matter is controversial.

As world opinion stands at the moment, however, it is generally accepted that most people will have some impairment if the *blood alcohol* level is 150 mg. per 100 ml. or over although it is impossible to dogmatize over individual persons. So, too, the majority of people will be unconscious if not critically ill at a figure of 400 mg. per 100 ml., although once again, personal experience has demonstrated persons who have died after doing things with higher blood figure levels.

Finally, lest it should be thought that determination of the amount of alcohol in the blood or urine is only of value in cases of intoxication of medico-legal interest, it must not be forgotten that alcoholism exists and estimations in the blood may be of quite considerable diagnostic or exclusive value.

Reference

British Medical Association (1954): 'The Recognition of Intoxication', London.

PRINCIPLES OF REHABILITATION

XI.—DAY CENTRE AND REHABILITATION FACILITIES

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Hitherto in this series, for the sake of clarity the various methods of rehabilitating people have been broken down into methods of obtaining different types of independence. When dealing with an actual patient, all these different methods have to be integrated to form a uniform pattern on which the treatment of the whole person can be planned. In order to do this there has been developed in some more modern and specialized departments of physical medicine a section which is run in close conjunction with the physiotherapy section in which the patient can have a complete build up, both by the expert treatment of joints and muscles and the like, and by retraining in the necessary skills for the various functions, assisted when necessary by the provision of aids and gadgets.

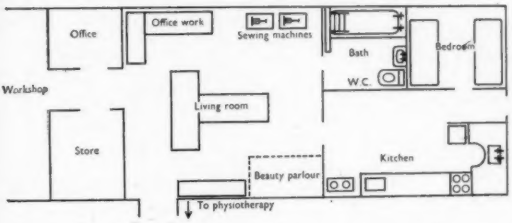

Fig. 1.—The Daily Living Department.

After the stage of assessment, a full programme is planned, the object being to provide an integrated programme of physiotherapy and retraining in daily living, of sufficient length to occupy the patient from 10.00 hours until 15.30 hours. This time is normally sufficient to allow for the requisite period of muscle building and also retraining in dressing, practice with walking aids, wheel-chairs and the like, manœuvres involving bath and W.C. and practical work in the kitchen and the rest of the daily living department. The programme varies with each individual from day to day since certain individuals will be concerned in the preparation of food for the mid-day meal; others in cleaning, polishing, dusting, and laying the table; others with washing-up, whilst the afternoon will be devoted to cake-making, sewing-machine work, practice in writing, typing and the like.

THE DAILY LIVING DEPARTMENT

The accompanying plan (fig. 1) shows the layout of the Daily Living Department in use at this hospital, and also shows its proximity to the carpentry and physiotherapy sections. In the carpentry section frequent use is made of patients' labour in the manufacture of various gadgets. The daily living

department is 20 feet (6 metres) wide and 40 feet (12 metres) long. The equipment is standard household articles, the cost of which is surprisingly little when compared with equipping other hospital departments. A department of the size illustrated can comfortably cope with eight to ten people a day and enable each one to have adequate practice time in any particular function in which she requires retraining. The general principle is that the patients are shown how to do things and, if necessary, allowed simple gadgets to facilitate this. Thereafter they are given the minimum help or none whatsoever, the whole object being to produce independence. At first, various tasks may take the patient an inordinate length of time to perform but, provided the patient is not helped, it is equally surprising how quickly most people reduce this time to within reasonable limits. The contrast in this respect is always most striking when one compares it with patients who have been treated at home and have unfortunately been given a little bit of help 'because it is so much quicker'. The spirit of competition is always present to a greater or lesser extent and this is a most useful stimulus in the building up of morale and the will to succeed.

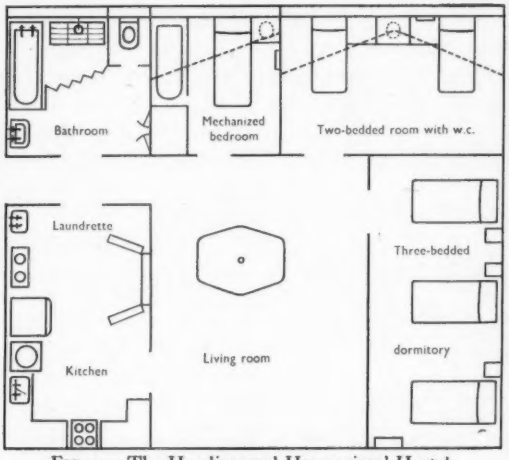

FIG. 2.—The Handicapped Housewives' Hostel.

THE HANDICAPPED HOUSEWIVES' HOSTEL

When the patients have proved efficient during this 5½-hour daily period, we then like to admit them to the Handicapped Housewives' Hostel. Here no help is provided other than that given by other handicapped people. Materials for meals are delivered in the raw state every day and the patients are completely responsible for arranging the routine and the carrying out of the multifarious duties which occur in the normal running of a house. The object here is twofold: to test out their independence; and secondly, and much more important, to enable the patients to get back their confidence by proving to themselves that they are capable of round-the-clock independence. This handicapped housewives' hostel was opened in March 1960, and has dealt with a wide variety of handicaps resulting from hemiplegia due to cerebral vascular accidents; rheumatoid conditions; multiple

sclerosis, and poliomyelitis, to mention but a few. The stimulus of being with other people who are trying to overcome their disability is a great help to morale and it is always surprising how well the patients work in together despite even wide disparity in age and the types of illnesses and functions.

Figure 2 shows the arrangement of the hostel. Outside the front-door is a 'Perspex' roof covering for electrically propelled tricycles, and water-proof electric sockets are provided for the charging of these.

THE BEDROOMS

The accommodation consists of a three-bedded dormitory with virtually no gadgetry other than easily accessible curtained wardrobes and dressing tables which can be used by ambulant or chair-fast people. There is also a two-bedded bedroom which is provided with a sound-proof lavatory with an extractor fan situated between the two beds, and which can be closed up completely when not in use. Access to this by the patient is either by sliding along the boxed-in furniture or by using the hoist on the overhead track.

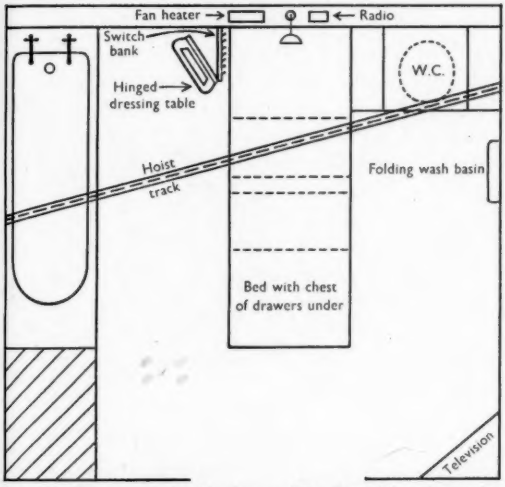

FIG. 3.— The mechanized bedroom. The dotted line shows the position of electric hoist track in relation to bed, bath and W.C.

Finally, there is a single bedroom (fig. 3) occupying a space of 11 feet (3.35 metres) by 10 feet (3.05 metres) containing a bath, chair-loading bay, plinth-type bed and with chest-of-drawers accommodation in its base. The drawers slide in and out on either side of the bed plinth and are therefore accessible from either side. On the far side of the bed there is another chair-loading space and a similar water-flushing lavatory, and also a caravan-type folding wash-hand basin for cleaning the hands before leaving the actual lavatory seat. All the electric controls are let into the head of the bed and a panel of eight switches controls the two-speed fan for hot, cold or warm air currents, the extractor fan, the radio, the television, and the bed-light plugs. Overhead is a length of track which runs almost at right-angles to the long axis of the bed and carries an electric hoist which can be used as necessary. All the electric circuits in this room are supplied through

a 1-1 transformer and are entirely earth-free. We considered this adequate protection when using the electric hoist over the bath but, in addition to this, the hoist cords themselves are made of nylon and the patient is therefore almost completely isolated from the hoist. In passing, it is interesting to note that we estimated that a complete room such as this, with the honest cooperation of the builder concerned, could be installed into a suitable pre-existing room for under £200, and would enable a person with only one useful upper limb to be independent to a very great extent.

THE LIVING-ROOM AND KITCHEN

The *living-room* has a novel form of table which is supported on a vertical 2½-inch (6.5 cm.) piece of piping which runs from the floor to the ceiling through the centre of the table and thereby eliminates uncomfortable legs at the periphery of the table. Two forms of seating are provided: orthodox hard chairs for sitting at the table, and Parker Knoll armchairs, half of which are provided with legs 4 inches (10 cm.) longer than standard length to enable certain types of people to get up and sit down more easily. This extra length of leg was provided very willingly by the firm concerned and entailed only a few days added on to the time of delivery.

The *kitchen* differs from the daily living department kitchen in that here we go from inexpensive simplicity to a much more expensive mechanized type of kitchen. Through the courtesy of Kenwoods we were able to provide a highly mechanized one including electric mixers, Wastemaster, dish-washing machine, and a combined refrigerator and deep freeze. The farther end of the kitchen is the laundrette where a washing-machine, ironing board, and overhead airing-rail are provided.

THE BATHROOM

The bathroom has three especial features: (i) The bath is provided with vertical hand-rails on each side. (ii) The bath itself is a dropped-front bath which has the effect of reducing the over-all depth in the bath from 16 inches (40 cm.) to 13 inches (33 cm.) and, most important, has easy access owing to the whole bath being raised to 15 inches (38 cm.) by five courses of bricks. (iii) For those unable to use a bath, a slatted teak seat with a shower directed between the shoulder blades is provided with a tap within easy reach. To avoid burning people through the well-known failures of mixing valves, a small 12-gallon tank is fitted separately for the purpose of supplying the shower and this is maintained by thermostat at a temperature of 110° F. (43.3° C.), the water leaving the shower being within a degree or two of 105° F. (40.5° C.).

Both the daily living department and the handicapped housewives' hostel were made possible through the generosity of the Nuffield Provincial Hospitals Trust.

REVISION CORNER

ANOSMIA AND PAROSMIA

THE sense of smell is the most ancient of the special senses. Phylogenetically the primitive development of the cerebral hemispheres—the palæocortex—is largely concerned with the reception and interpretation of olfactory stimuli, and with the ordering of motor behaviour based thereon. So in the lowest vertebrates the brain is essentially a rhinencephalon or smell brain but, as the animal scale is ascended, other functions are added and elaborated by new expansions of cortical matter (neocortex) and in man the rhinencephalon composes only a very small part of the total mass.

ANATOMY AND PHYSIOLOGY

Anatomically the olfactory pathways arise from sensory receptors in the nasal mucosa; these are not diffusely distributed but are restricted to an area high up in the posterior part of the septum and on the opposite lateral walls over the superior nasal concha. Just how these receptors are stimulated is still not known, but it is plain that the mechanism must be fundamentally chemical. They project by way of fine filaments passing through the cribriform plate of the ethmoid bone to the olfactory bulbs, where they synapse with the mitral cells which relay in the olfactory tracts. The latter divide into lateral and medial striæ, the lateral stria ending in the olfactory cortex in the region of the uncus of the temporal lobe on its medial aspect, whilst the medial stria makes complex deep connexions which it is unimportant to detail. The lateral stria can be looked on as carrying impulses which ultimately mediate the conscious perception of odours, whilst the medial stria is concerned in subconscious olfactory reflexes.

As to the general physiology of smell in man, it is a relatively unimportant sense from the practical point of view although, as Proust, the great French novelist, understood, it has an astonishing power of arousing memories and of tincturing emotion. The degree and the range of its acuity seem to show considerable diversity from one person to another, and as a rule is more developed in women than in men. It is a sense certainly much keener in children than in adults, and fades progressively though slowly with later ageing. Disorders of it can arise from local causes in the nose or from lesions which damage its neural mechanisms.

TESTING FOR ANOSMIA

It is usually advised that the sense of smell should be tested with special bottles containing oil of cloves, oil of peppermint, tincture of asafœtida and so on. This, however, is not a really practical line, not only because they may not be readily available but because even normal patients often cannot recognize them. It is far better to use everyday objects which have a dis-

tinctive odour and which can be found in any household, such as freshly bruised orange peel, a small coffee tin, moistened tablet of soap, burnt cigarette stub or unlit pipe bowl. These can be offered to either nostril in turn (the other being pressed shut by the examiner) to sniff and identify.

ANOSMIA

Anosmia means complete loss of the sense of smell, and may be unilateral or bilateral; when there is only impairment and not abolition, the terms hyposmia or partial anosmia have equal descriptive currency. Unilateral anosmia (or hyposmia even when bilateral) is seldom a reason for seeking medical advice, as the patient is often unaware of it or accepts it without complaint; it is therefore a sign rather than a symptom of disease. Bilateral anosmia on the other hand is always noticed, not only in its own right, but because it simultaneously affects the discriminatory aspects of taste, leaving only the basic perceptions of sweet, salt, bitter and sour, which are mediated by the chorda tympani from the anterior two-thirds of the tongue and from the posterior third by the glossopharyngeal nerve.

Among nasal causes for anosmia, the commonest is the ordinary cold, which produces it in part by blocking the nasal airway and so quantitatively restricting the ascent of odours to the olfactory mucosa, and in part by interference with the access of odoriferous molecules to the chemosensitive receptors due to excessive sero-mucous discharge. It may arise similarly in allergic rhinitis, of which hay fever is an example. These, of course, are transient affections, but permanent anosmia or hyposmia may result from the structural mucosal changes of non-specific atrophic rhinitis, and many industrial agents in the form of dusts, fumes or vapours can lead to inflammatory, degenerative or ulcerative rhinitis with associated defect of olfaction. Lastly, it may be due to frank mechanical obstruction in the nose on one or both sides by nasal polypi, or by nasopharyngeal carcinoma, in the latter case in company with nose-bleeds, trigeminal pain and numbness, lower cranial nerve palsies, and lymph-node involvement in the neck.

Of neural causes, by far the most common is head injury, with or without fracture of the floor of the anterior fossa. There are two possible explanations for its occurrence in such cases, one being rupture of the olfactory filaments as they pass through the cribriform plate, and the other contusion or laceration of the olfactory bulb. It quite often follows severe concussion, is commonly bilateral, and apt to be permanent. If unilateral after cranial trauma, it can be an index of anterior basal fracture with associated dural tear, so that a history of cerebrospinal fluid rhinorrhœa should be deliberately sought. The point is important because in such circumstances there must be a risk of later development of meningitis or frontal lobe abscess by infection tracking through the fistula between nasal and intracranial cavities. Unilateral anosmia may be a particular sign of olfactory groove meningioma, or of frontal lobe glioma, in either case from compression of the olfactory bulb, and it is a possible feature of tumours of the sellar neighbourhood

which press on the posterior extension of the olfactory tracts on one or both sides. Such tumours are suprasellar meningioma, craniopharyngioma and pituitary adenoma, but also include non-neoplastic space-taking lesions, for example large internal carotid aneurysms which extend dorsomedially over the pituitary fossa, aneurysm of the anterior communicating bifurcation, and obstructive hydrocephalus which balloons the floor of the third ventricle downwards.

Anosmia is an occasional sequel of acute meningococcal or pneumococcal meningitis or of tuberculous or syphilitic meningitis, and exceptionally it may be caused by virus infection. It was established long ago that if the virus of poliomyelitis is inoculated into the nose experimentally, it can gain access to the central nervous system along the olfactory pathways, destroying ganglion cells in the bulb in the process. Other viruses with neurotropic propensities may sometimes attack the bulb spontaneously, as the following case shows.

A middle-aged man had typical 'Asian flu', and immediately after it found that his sense of smell had vanished completely, and that he could not taste flavours properly. He had no other neurological symptoms. This state lasted for about a year, and then recovered slowly but imperfectly.

Anosmia has been listed among the many symptoms of tabes dorsalis in the old neurological literature, presumably from degeneration in the olfactory tracts comparable with optic atrophy and tabetic deafness, but generally it can be said that demyelinating and degenerative diseases of the nervous system do not affect the sense of smell, nor do cerebral vascular disease or metabolic deficiency syndromes. Finally anosmia may be a hysterical symptom.

PAROSMIA

This term has two meanings: (a) distortion of sense of smell, so that although odours are perceived they do not have their familar quality; (b) a hallucination of odour in the absence of an external source.

Simple parosmia:—Parosmia of the first type is a symptom of olfactory dysfunction from any of the neurological causes of anosmia just listed, and again head injury is the chief. It is commonly accompanied by distortion of taste, so that flavours are also unnatural. Parosmic disorders may be affectively neutral but sometimes are actively unpleasant; they can be oddly selective rather than global, so that only some odours are perceived as abnormal whilst others are merely diminished in intensity, but not qualitatively changed.

Hallucinatory parosmia.—Although destructive lesions of the temporal cortex in the neighbourhood of the uncus and its underlying white matter never demonstrably impair the sense of smell, the occurrence of fits which have an olfactory aura from excitatory (epileptogenic) lesions of the same zone is well known. Seizures of this kind belong in the wide and pleomorphic group of temporal, or psychomotor, epilepsy which results from so many factors, ranging from gliotic scarring of the temporal lobe from birth

injury or anoxia, from later cranial trauma or cerebral abscess, through types of degenerative process, arteriosclerotic and otherwise, to intrinsic glioma, angioma, epidermoid and metastasis, or damage from extrinsically placed tumours such as the rare meningiomas of the middle fossa floor or lateral extrasellar extensions of a pituitary adenoma. Statistically, olfactory hallucination is relatively infrequent in temporal epilepsy, but it is interesting that in a number of cases in which it is not a feature of onset of attacks, there may be complaint of unpleasant post-ictal parosmia (with or without an unpleasant taste in the mouth) for hours, or even a day or two, after the seizures.

Finally, persistent hallucinatory parosmia may be a symptom of paranoid psychosis, either encapsulated or as part of a more florid system of delusions. In such cases the subject usually believes the odour to emanate from his own body, and interprets the actions of other people as determined by it, that they are avoiding or talking about him because of it.

MICHAEL JEFFERSON, D.M., F.R.C.P.
Neurologist, Queen Elizabeth Hospital, Birmingham.

NOTES AND QUERIES

Treatment of Rheumatoid Arthritis

QUERY.—I have a female patient, aged 46 years, who for some years past has been subject to attacks of general malaise, accompanied by a slight sore throat and faint pains of the rheumatic type. The attacks pass off in forty-eight to seventy-two hours, and are usually apyrexial, though sometimes the temperature may reach 99.2° F. (37.3° C.) but seldom going higher. The attacks vary in frequency, but are more prone to occur when there is a sudden drop in the atmospheric temperature, especially when the air is damp. More recently, she has had persistent pain and swelling in the left wrist-joint, and pain and stiffness in the small joints of the hands and feet. There is some 'spindling' of the interphalangeal joints, but x-rays show no bony changes in any of the affected joints. The blood count is normal and the erythrocyte sedimentation rate is 4 mm. in one hour (Westergren), but a screening latex test for abnormal rheumatoid arthritis globulins is positive, and Ball's modification of the Rose-Waaler test is positive in a titre of 1 : 64. It would seem that rheumatoid arthritis is latent in this patient. Her mother started active rheumatoid arthritis at the age of 60, and was crippled by it in a few years.

Apart from general attention to the health (which is otherwise good) and avoidance of chills and damp, is there any active treatment which could prevent or postpone the onset of active rheumatoid arthritis in this patient, and in others like her?

REPLY.—Although a number of febrile arthropathies could be considered here, such as abortus fever, polyarteritis nodosa and disseminated lupus erythematosus, the fact that the typical features of rheumatoid arthritis are beginning to appear, that the family history is positive, and that the latex and Rose-Waaler tests are already positive, makes this diagnosis almost, if not absolutely, certain. Few cases have such an abundance of positive points to enable the correct diagnosis to be made.

From the history, the condition has been present for some years, though only more recently has it localized in the joints. Such a history of generalized illness, with fever and systemic upset, may precede the articular stage by months or even years, as it has done in this case. Nevertheless, it would be as well to exclude disseminated lupus erythematosus by looking for the Hargreaves cell, for evidence of hæmolysins (Coombs' test), and performing Wassermann and Kahn tests and serum electrophoresis. The fact that x-rays are normal is to be expected, as the disease has only recently

affected the joints; sedimentation rates may be normal on occasion even with active disease.

As regards treatment, there is no certain way of preventing the progress of the active disease which is obviously present here. The most important thing is to make sure that the patient gets adequate rest and never tires or overfatigues herself. She must be told that she has active rheumatoid disease, and how to live with it. Full salicylate therapy (acetylsalicylic acid in some form) should be instituted. In such cases a period in hospital for complete rest and treatment, and instruction in her condition and the treatment of it, is to be strongly recommended. Antimalarials or gold may be necessary if these other measures fail to avert the disease, and these forms of therapy should be seriously considered if such is the case. It is at this relatively early stage that full investigation and therapy should be instituted rather than later on.

F. DUDLEY HART, M.D., F.R.C.P.

Thrombophlebitis Following Pneumonia

QUERY.—Mrs. X., aged 48 years, menopausal, complained of acute low backache in January 1961. This followed frequent lifting of her hemiplegic mother on and off the commode. I diagnosed low back pain, probably ligamentous in origin. She rested in bed and had physiotherapy, heat and massage. Seven days later she developed left lower lobe lobular pneumonia, which was treated by broad-spectrum antibiotics. One week later a similar lobular patch of pneumonia developed on the right lung. I now decided that the condition was embolic. My patient was transferred to hospital, where after a stormy chest infection she developed a week later classical deep femoral thrombosis in the right leg. Anticoagulants were started three days before this and have been continued to date. The prothrombin rate is 25% of normal. Four weeks after the signs of the original deep thrombosis, the other foot became slightly swollen for two to three days without any other clinical signs, and this followed early mobilization.

For what period do you consider I should continue anticoagulant therapy? I have been given varied advice on this matter.

The patient is now quite active and doing most of her household duties and, apart from a little tiredness, has no complaints. She has only occasional menses now and has never had any children. Her previous health has been very good but there has been a strong family tendency to thrombophlebitis. She has no visible varicose veins of the legs and the right leg is still half-an-inch (12 mm.) thicker at the mid-calf and mid-thigh level; but no pitting œdema is present. She takes phenindione, 50 mg. twice daily.

I should be most grateful for advice.

REPLY.—It is always difficult to be quite certain that phlebitis will not recur, but once the patient is fully ambulant it is usually safe to discontinue the anticoagulant therapy and I suggest that this be done in this case. It would, however, be wise to do so gradually over two to three weeks by halving the dosage, to prevent a theoretical 'rebound phenomenon'.

H. A. DEWAR, M.D., F.R.C.P.

Lipstick Dermatitis

QUERY.—I should be grateful for advice on the following problem.

A married woman, aged 24, has suddenly become sensitive to lipstick, causing dermatitis of both lips. She has used various brands of lipstick for ten years, and has not recently changed her brand. I believe that there are certain brands of lipstick on the market specially designed for those with sensitive lips. Are they likely to be effective in a case such as this and, if so, what are the names of these lipsticks.

REPLY.—The common cause of contact dermatitis due to lipstick is the dye, which is usually a derivative of fluorescein called eosin. This dye easily combines with the skin keratin. These dyes are used to render the lipstick indelible. Occasional reactions to the ingredients of the stick or to perfume may also occur, but these are very rare. Eosin dyes may induce sensitivity to sunlight so it is important that overexposure should be avoided.

The patient should buy an eosin-free lipstick which she ought to be able to use without difficulty. If she still gets dermatitis it is a question of patch testing with the various ingredients of the lipstick to determine the sensitizer. Most of the cosmetic firms will provide the ingredients for patch testing on request.

GEOFFREY HODGSON, M.B.E., M.D.

Treatment of Chronic Salpingitis

QUERY.—I should be most grateful for advice on the dosage and duration of cortisone therapy for sterile women who refuse salpingostomy.

I can only imagine that the mechanism of cortisone's effectiveness is in freeing adhesions.

REPLY.—There is no evidence that cortisone therapy will dissolve adhesions, but cortisone and an antibiotic may clear up a chronic infection, reduce œdema and minimize scar formation. Thus, prednisolone, 5 mg., three times a day, with an antibiotic and short-wave dia-

thermy has been suggested for chronic salpingitis—though the results are uncertain.

More recently an intra-uterine injection of procaine, streptomycin and hydrocortisone has been used (Green-Armytage, V. B., 1960: *Proc. Roy. Soc. Med.*, **53**, 357). Having excluded pelvic tuberculosis by history, examination and endometrial biopsy the patient is given intra-uterine injections of the following mixture at weekly intervals, the cannula being kept in position for 20 minutes:—

Procaine hydrochloride	100 mg.
Streptomycin sulphate	1 g.
Hydrocortisone	25 mg.
Sterile normal saline to	10 ml.

When the salpingogram shows minimal distortion and distension it is hoped that the tubes will unblock. These injections are recommended with perhaps more justification following salpingostomy and tubo-ovarian implantation.

IAN JACKSON, M.B., F.R.C.S., F.R.C.O.G.

Tooth Extraction in Diabetic and Hypertensive Patients

QUERY (from a reader in India).—Is it necessary to take any special precautions before extracting a tooth in (i) a diabetic subject, (ii) a hypertensive subject? If so, what are they?

REPLY.—(1) *Diabetic patients.*—It is essential that an antibiotic cover be given before removing teeth in order to avoid infected sockets, as these patients are prone to sepsis. This may be started on the day of extraction and continued for two or three days post-extraction. Local anæsthesia may be used, and it is not necessary to employ adrenaline-free anæsthetic solution. If general anæsthesia is desired, a good time is just before the next meal is due, in order to minimize interference with the diabetic regime. For longer dental operations the help of a specialist anæsthetist is desirable in arranging the preoperative preparation of the patient with regard to his calorie needs. It is essential that the patient adheres to the dietary regime, and if necessary substitutes soft foods of equivalent calorie value when there is soreness of the mouth following extractions.

(2) *Hypertensive patients.*—These people are treated essentially as normal patients. For those who are unduly apprehensive a barbiturate may be given, but this is usually not necessary. As an anæsthetic solution I use 2% lignocaine with 1:80,000 adrenaline, which is given by the normal technique. After the extraction the patient bites on a gauze pad. If hæmostasis is not achieved by this means in about half-an-hour the mucosa of the edges of the socket must be sutured and the patient instructed to bite again on a gauze pad. This is usually sufficient to avert hæmorrhage. Very occasionally hæmostasis is not achieved by suturing and pressure pads. For these people, rest in bed following extraction, with the head supported by extra pillows so that it is above the level of the bed, together with an injection of morphine, perhaps $\frac{1}{6}$ or $\frac{1}{4}$ grain (10 or 15 mg.), to be repeated six-hourly if necessary for twenty-four hours. In my experience admission to hospital was necessary for one patient only following multiple extractions.

If a general anæsthetic is required the services of an expert anæsthetist should be sought.

HARRY MCINTYRE, M.B., B.D.S., F.D.S.R.C.S.

A Dysenteric Problem

QUERY (from a reader in India).—A patient, aged 42 years, had a severe attack of dysentery (? amœbic) four years ago with typical griping pains, blood and mucus. Repeated stool examinations did not show any *Endamœba histolytica* or any other pathological organism. Prolonged treatment with emetine, penicillin, succinylsulphathiazole and bialamicol during the last four years has led to a great improvement in the clinical condition, but there is still a considerable amount of tenderness in the cæcum and the transverse colon, with two to three semi-solid motions daily. Barium meals, x-rays and sigmoidoscopy have failed to reveal any abnormality. In addition, the patient has been complaining of increasing general debility, darkening of the colour of the skin and loss of memory. Injections of liver extract, combined with high doses of cyanocobalamin and folic acid give temporary relief.

I should be most grateful for expert advice on diagnosis and treatment.

REPLY.—It is very difficult to give useful advice in such an obscure case. Full investigation of malabsorption is probably necessary as 'blind loops' can be difficult to exclude radiologically. If the patient's condition is deteriorating, two possible lines of treatment would be the administration of streptomycin in the treatment of possible hidden abdominal tuberculosis, or laparotomy.

FREDERICK J. WRIGHT, M.D., F.R.C.P., F.R.C.P.ED., D.T.M. & H.

Hot-air Sterilization of Syringes

QUERY (from a reader in N. Rhodesia).—General practitioners have difficulty in maintaining good standards of sterilization. Is it possible to use the ordinary domestic oven as a dry sterilizer? What temperature is necessary for baking bread? If this system could be used, syringes could be packed in suitable metal containers—a system which many practitioners in

country districts in Africa would find convenient.

REPLY.—Sterilization by hot air consists of keeping the article at a minimum temperature of 320°F. (160°C.) for a minimum time of one hour. Most syringes manufactured today may be heated to temperatures well above this without causing damage. Such syringes may be hot-air sterilized in any type of domestic oven. In those thermostatically controlled, the oven may be set in the case of an electric oven to 320°F. (160°C.), or, if gas heated, regulo reading 3 or 4. If the oven is not thermostatically controlled, then the syringes should be treated as if they were a fruit cake, as most cooks bake fruit cakes between 320°F. and 360°F. (160°C. and 180°C.). It should be emphasized that with the modern syringe the temperature at which it is sterilized is not critical, provided that it is above 320°F. (160°C.). (Bread is baked at between 400°F. and 500°F. [210°C. to 260°C.], which is needlessly high.)

It is extremely simple to test the efficiency of the method by using a Brown's control tube for hot-air sterilization.

J. COLQUHOUN, M.B., CH.B.

Heredity in Idiopathic Epilepsy

QUERY.—I should be grateful for an opinion on the following case:

I have a normal healthy woman patient aged 24 years, whose husband is also aged 24 years. The man has had about three epileptiform fits in the past year. He was free from fits for about seven years, and between the ages of 11 and 16 years he had about six a year. He is considered to be an idiopathic epileptic and the wife wishes to know if they are wise to have children, and what is the risk of the children developing epileptiform fits.

REPLY.—The over-all risk of a child of an adult idiopathic epileptic also developing epilepsy is low, and of the order of 3 per cent. (Alström, 1950; Harvald, 1954). If, however, any of the husband's near relatives are affected the risks would be increased.

References

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Harvald B. (1954): 'Heredity in epilepsy', Copenhagen.

C. O. CARTER, B.M., M.R.C.P.

Continental Typhoid

DR. E. B. MEYRICK, Medical Officer of Health for Swansea, writes:—'Arising out of the note on "Continental Typhoid" in the September issue (p. 266), you may be interested to learn that, for a number of years now, all Swansea schoolchildren travelling with official school parties to the Continent have been advised by letter to be vaccinated against smallpox and immunized against typhoid and paratyphoid fevers. The vast majority accept this advice'.

PRACTICAL NOTES

Congenital Pyloric Stenosis

CONGENITAL pyloric stenosis is in Britain the commonest disorder in children requiring surgical intervention, according to C. O. Carter (*British Medical Bulletin*, September 1961, **17**, 251). The ratio of male to female patients varies from 4:1 to 5:1, and the incidence of confirmed cases in England and Scotland is about 3 per 1000 live births. Allowing for a sex ratio of 5:1 this means that the incidence in Britain is about 1 per 200 male live births and 1 per 1000 female live births. It is not certain that the hypertrophy is truly congenital in the sense of being present at birth. There is no satisfactory report on a pyloric tumour in a stillborn child, but in premature infants in whom the condition occurs with the same frequency as in full-term infants, symptoms often develop before the child's expected date of birth. 'It would appear therefore that a short period of extra-uterine life is needed for the tumour to develop sufficiently to cause symptoms'. The etiology is complex and both genetic and environmental factors are involved. Three clues are given to environmental factors which may be important. One is that the condition may be more common in first-born children among patients in whom the onset of symptoms is in the third week or later. The second is that the onset of symptoms is later in children born in hospital than in those born at home. The third is that the onset of symptoms is later in infants fed four-hourly than those fed three-hourly. As a result of a study of the children of parents who themselves had congenital pyloric stenosis, it is suggested that 'the predisposing genotype has two components, first a common dominant gene, and second a sex-modified multifactorial background'.

Nocturnal Enuresis

'BEDWETTING can nearly always be regarded as a part of the child's emotional reaction to life', according to D. T. Maclay (*Medical Officer*, August 18, 1961, **106,** 111). Outlining a 'policy for treatment' he divides enuretics into three groups. The first group consists of those with a bad home environment in whom everything possible must first be done to ameliorate the environment. In the second group are the insecure children with a good home background in whom the approach must be to deal first with the child's more general anxieties or personal difficulties. The third group includes those children in whom enuresis continues in the absence of other marked signs of maladjustment and also those cases from the first two groups who continue to wet their beds after a satisfactory measure of adjustment has been achieved in other respects. In this group there may be symptoms in addition to the bedwetting which warrant referral to the child guidance clinic but 'in the majority of cases no such referral should be necessary' and the suggested line of treatment is: (1) interviews with the mother to allay her anxiety, (2) suggestive therapy with the child, reinforced by drug therapy, and (3) the use of the electric bell. Ideally the practitioner should himself fix the apparatus to the child's bed and explain its working fully to the parent as well as paying a weekly home visit to supervise its working and the child's progress.

In a survey among 430 schoolchildren aged 10½ to 11½ years, Elizabeth Jones (*Ibid.*, p. 114) found 32 (7.4%) suffering from enuresis. Her general impression was that 'while illness, or adverse environmental, emotional or social factors may precipitate the onset of nocturnal enuresis or prolong its duration, genetic factors may be of more significance in the etiology'. That 'nervous tension, conscious or unconscious, over education' has an adverse effect on some children was suggested by the facts that one boy stopped bedwetting immediately after the 11-plus examination, and 'what is more striking, 13 children with occasional or moderate enuresis were spontaneously cured before the end of the first term in the secondary modern schools'. The size of the family or the position of the child in the family did not appear to have any association with enuresis.

Penicillin and Pharyngitis

'A SINGLE injection of 1.2 million units of benzathine penicillin G is an effective treatment for acute streptococcal pharyngitis in the adult patient' is the conclusion reached by G. T. Mullin Jr. and his colleagues (*Proceedings of the Staff Meetings of the Mayo Clinic*, August 16, 1961, **36,** 423), based upon the results obtained in 241 cases aged 15 years or older. If the clinical impression at the time of the initial visit, and before incubation of the throat swab, was acute streptococcal pharyngitis the patient was given either a single injection of 1.2 million units of benzathine penicillin, or one injection of 1.2 million units of benzathine and another of 600,000 units of an aqueous suspension of procaine penicillin. This latter treatment tended to be given in the more serious cases. Patients were asked to report two weeks later in order that a second throat swab might be taken. An analysis of the results showed that benzathine penicillin alone failed to eradicate the streptococcus in 7% of the 59 patients in whom reculture was performed: the comparable failure rate for the combination with procaine penicillin was 6% of the 53 patients in whom a second throat swab was obtained. Cutaneous reactions occurred in six (2.5%) of the 241 patients, but the incidence of pain at the site of injection was much higher: pain at the site of injection of the benzathine penicillin for one to seven days was complained of by 24% of the 59 patients receiving benzathine penicillin who returned for a second throat swab.

Cycloserine in Urinary Infection

CYCLOSERINE is a valuable drug in the treatment of urinary tract infections which have failed to respond to the more commonly used drugs in the opinion of J. Syme and his colleagues (*British Journal of Urology*, September 1961, **33,** 261), who treated 40 patients (37 females and 3 males) aged between 13 and 78 years. The duration of symptoms ranged from three days to thirty-seven years. Thirty patients (75%) had already received treatment with sulphonamides, chloramphenicol, streptomycin, tetracyclines, or penicillin on one or more occasions without success. All had a history of malaise, frequency of micturition, back or loin pain, or nocturia, and eight had diabetes mellitus. Five required surgical treatment before receiving cycloserine. Dosage was 250 mg. orally eight-hourly for fourteen days. In 36 patients (90%) there was rapid regression of all symptoms and signs, the other four failing to respond to treatment. Fluid intake was restricted to 1,400 ml. or less during treatment. It is emphasized that 'the risks of toxic effects will be minimized by biochemical assessment of renal function before, and estimation of plasma levels of the antibiotic during, treatment. As with any other antibacterial agent, drainage defects of the urinary tract should be sought and, if possible, corrected before treatment. Clinical and

bacteriological follow-up should be prolonged'.

In another series, M. M. Kubik and K. Datta (*Ibid.*, p. 267) gave cycloserine to 150 patients with urinary infection which was discovered on routine examination. Sixty of these (82%) were over the age of 60 and the remainder over 40. The infection was symptomless in 73%, the main symptoms in the remainder being frequency of micturition and nocturia. Fifty-six patients had already received treatment with one or more antibiotics; the remainder had had no previous treatment. Response was better in the former than in the latter. Dosage was 250 mg. twice daily in 79 patients and thrice daily in 71, and the results were 'rather paradoxical', being better in those taking 500 mg. daily than in those taking 750 mg. Results were good in 74 patients (50%), fair in 33 (22%); 43 (28%) did not respond to treatment.

Absorption Rate of Salicylates

THE effect of dosage form on gastro-intestinal absorption of salicylates was investigated by G. Levy and his colleagues (*Canadian Medical Association Journal*, August 19, 1961, **85**, 414). They found that aspirin is absorbed far more rapidly when given in an aqueous solution than when administered in tablet form. Twelve healthy male subjects were given 10 grains (0.6 g.) of aspirin in the morning on an empty stomach. Three different brands of aspirin (one buffered) and three aqueous solutions of aspirin (one of sodium salicylate, one of choline salicylate and one prepared from the buffered tablets) were used. The tablets were swallowed whole, followed by 100 ml. of water, and the solutions consisted of the same quantity of drug dissolved in or diluted to 100 ml. Absorption rates were studied by the urinary excretion method, and the rate for the solutions was 'significantly greater' than that for the tablets. Significant differences in the gastro-intestinal absorption rates of choline salicylate and sodium salicylate have been reported but in this investigation there was no appreciable difference between the two when administered in solution form. It was concluded that such reported differences are due principally to dissimilar dosage forms and 'an appreciation of the contribution of the dosage form and of certain other experimental variables may result in a more rational approach to the clinical evaluation of drug products'.

Drug Reactions in the Treatment of Tuberculosis

IN the treatment of tuberculosis, allergic reactions to drugs may be expected in 12% of patients, according to J. M. Smith and M. H. Zirk (*Tubercle*, September 1961, **42**, 287) who investigated toxic and allergic reactions in 628 new cases during their first year of treatment. Allergic reactions to streptomycin occurred in 44 patients (8% of those at risk), to PAS in 54 (8.7%), and to both streptomycin and PAS in 23 (5%) of 472 patients who received both drugs for at least six weeks. Treatment had to be stopped because of toxic reactions to streptomycin in 44 patients (8%) and to PAS in 3 patients (0.5%). There were no reactions to isoniazid. Both toxic and allergic reactions occurred twice as often in women as in men. It was concluded that it may be desirable for patients to receive their first five or six weeks of treatment in hospital so that if allergic reactions occur they may be treated by desensitization which 'should rarely fail if a satisfactory technique is employed'.

Rupture of the Aorta

THE sudden and usually catastrophic rupture of an aortic aneurysm is an event that sometimes casts its shadow beforehand, according to C. T. Dotter and his colleagues (*New England Journal of Medicine*, August 3, 1961, **265**, 214), who suggest it should now be possible, in some cases at any rate, to prevent the disaster by timely surgical repair. They point out that diagnosis of impending rupture is made possible because of two factors that regularly occur in the natural history of aortic aneurysms: namely, transmural bleeding and aortic enlargement. These precede rupture, though sometimes by a comparatively short interval, and their recognition by the radiologist should be regarded as an important indication for surgical intervention. Transmural bleeding often gives rise to symptoms, chest pain or hæmoptysis, whilst the expanding aorta may produce hoarseness, cough or dysphagia. The acute tearing chest pain of a dissecting aneurysm may also occasionally be encountered. The authors stress that the occurrence of such symptoms should be regarded as an imperative indication to take x-rays of the chest and to look especially for any recent change in the aortic outline. Enlargement or diffuseness that was not present before is sufficient to warn that rupture is an immediate possibility. With modern surgical techniques now available the authors say that the surgeon 'has a good chance of success'.

A Cheap Miniature Enema

MINIATURE enemas are tending to replace the one-pint soap enema in view of their convenience, but their price is rather prohibitive—

1s. 9d. to 2s. 6d. depending upon the quantity ordered. A method of producing miniature enemas at an ingredient cost of about ½d. per enema is described by B. M. Black, the chief pharmacist, the Women's Hospital, Liverpool (*Pharmaceutical Journal*, September 9, 1961, **187**, 225). The miniature enema developed in this hospital makes use of a discarded 2-ml. plastic syringe as a carrier and a 2-inch (5-cm) length of polythene tubing from a discarded disposable transfusion set as an applicator. For the actual enema, two formulæ are used:—

(a) Bisacodyl	5 mg.
Glycerin	0.5 ml.
Comprox	to 2.0 ml.
(b) Bisacodyl	5 mg.
Turpentine oil	0.75 ml.
Solution of amaranth	q.s.
Comprox	to 2.0 ml.

(b) is coloured to distinguish it from (a). It is intended for postoperative use and for the treatment of chronic constipation.

Syringes and polythene tubing are washed in a solution of chlorhexidine dihydrochloride. Filled with enema, they are sent to the wards in Cellophane envelopes. Syringes are returned for refilling, but applicators are used once only. Over 500 of these enemas have now been administered.

Prematurity and the Teeth

THAT medical practitioners should inform the family dentist when a premature child is born so that special instruction may be given to parents on diet and oral hygiene is the suggestion of J. Houston and J. Aitchison (*British Dental Journal*, September 19, 1961, **111**, 210) following an investigation of the oral condition of 56 children born prematurely in Glasgow during the three years 1951-53. They found that children born prematurely were 'more prone to caries of the deciduous dentition than those born after full-term gestation'. Among children born prematurely the mean average number of carious teeth (including missing and filled teeth) at the average age of 6 years was 10.9 for males and 9.75 for females. These rates were 'grossly in excess' of the average figure for five-year-old London schoolchildren during the same three years, i.e. 5.8. Apart from the possible association with calcific defects seen in prematurely born children it is suggested that a contributory factor to these high rates 'could well be the often excessive care and pampering given to premature children by well-meaning parents and relations resulting in a very high carbohydrate intake in the form of sweets and soft drinks'.

Dental Caries in Schoolchildren

THE results of a ten-year investigation into the relationship between malocclusion, oral cleanliness, gingival conditions and dental caries in schoolchildren are reported by J. Miller and P. Hobson (*British Dental Journal*, July 18, 1961, **111**, 43). The study was made in Manchester on a population of schoolchildren, aged 3 to 15 years, numbering 1,200, with an annual turnover rate of 150 to 200 pupils. More than 20,000 examinations were made and the authors attempt to relate the various conditions to one another and to demonstrate statistical correlations between them. Emphasizing that such significant associations as they were able to show do not necessarily indicate a cause and effect relationship they nevertheless suggest that further evidence may well strengthen such a view. The incidence of malocclusion was highest in the 11- to 12-year-olds, 50% of whom had some degree of this condition, which appeared to be aggravated by the extraction of deciduous molars by the age of 6 years. Children with malocclusion had poorer gingival conditions and higher caries rates than those with normal occlusion; better gingival conditions were found to be related to regular oral cleanliness, which, incidentally, the authors encountered more often in girls than boys.

A New Method of Tooth Cleaning

DENTAL cleaning tablets are as efficient as toothbrushes in removing carbohydrate debris from teeth. This is the major conclusion of R. Clark and his colleagues (*British Dental Journal*, October 3, 1961, **111**, 244) and A. B. Cobb and his colleagues (*Ibid.*, p. 249) as a result of trials they have carried out. The tablets each contain 92% sorbitol, 4% malic acid, 2% sodium chloride and 2% tricalcium phosphate. The first three of these are all salivary stimulants and the tricalcium phosphate is added to prevent any risk of dental erosion by the acid in the tablets. They dissolve in the mouth in about five minutes, and they were found to stimulate 25 to 30 g. of saliva. It is this increased flow of saliva that is responsible for the removal of the carbohydrate debris. As is pointed out, 'saliva is a major factor in dental cleaning. Stimulating the salivary flow increases the rate at which carbohydrate debris is removed from the mouth'. These dental cleaning tablets are said to have been acceptable to the volunteers who participated in the trials. Their practical advantage is that they can be used much more conveniently after meals than a toothbrush. In parenthesis, it should be noted that chewing a quarter of an apple was much more effective than either toothbrushing or using these tablets.

REVIEWS OF BOOKS

The Biology of Pyelonephritis. Edited by EDWARD L. QUINN, M.D., F.A.C.P., and EDWARD H. KASS, M.D., PH.D., F.A.C.P. London: J. & A. Churchill Ltd., 1960. Pp. 708. Illustrated. Price £6 10*s.*

This book contains the proceedings of the symposium sponsored by the Henry Ford Hospital which was held in Detroit during October 1959. Some idea of the scope of the work can be gained from the titles of the seven sections: 'Pathogenesis of pyelonephritis', 'Structure and function of the kidney', 'The renal lesion in pyelonephritis', 'Functional disturbances associated with pyelonephritis', 'The microflora in pyelonephritis', 'Relationship of pyelonephritis to other clinical states' and 'Treatment of pyelonephritis'. The majority of the 46 erudite papers are based on work carried out in the research laboratory. Most of these have a direct bearing on the problems of urinary infection but some, including the papers on cytochemical and electron microscopic studies of the rat kidney, quantitative histochemistry of the nephron, mechanisms of urinary acidification and inborn errors of tubular function, are relevant to pyelonephritis only because they are concerned with renal tubular structure and function in health and disease. Little attention is devoted to the surgical aspects of the disease and, although recent advances in this field have been meagre, it is surprising that no contribution on vesico-ureteral reflux is included.

In general, it is fair to describe the tone of this book as scientific rather than clinical, and speculative rather than didactic. This symposium must be judged on its value as a stimulus and a guide to future research. As such it would appear to be the best work on pyelonephritis yet published.

A Guide to Cardiology. By J. C. LEONARD, M.D., M.R.C.P., and E. G. GALEA, M.B., M.R.C.P., M.R.A.C.P. Edinburgh: E. & S. Livingstone Ltd., 1961. Pp. 267. Illustrated. Price 27*s.* 6*d.*

Some like their textbooks of medicine whole and others in pieces. For the latter, this cardiological piece has much to commend it, and it is about twice the size of the section on diseases of the heart and circulation of an average British textbook of medicine. These two guides, one from Manchester and the other from Brisbane, disarm potentially critical clients with a quotation from Pope, and then proceed in a thoroughly workmanlike manner to lead the way through the highways and byways of cardiology. They provide throughout a clear and reliable account of the cardiological scene, and they dispense sensible and practical advice. Some of the subjects are introduced with a quotation to beguile the flagging traveller—and quaintly assorted these are. And at the end of the journey the reader is left with the feeling that these are no employees of an upstart agency, but able and modest young men in the authentic uniform of the old and much respected firm—conscientious, accurate, polite and shrewd. Sometimes it seems that perhaps their youth is almost too well disguised, and their style too stolid. But there can be no doubt that they will find wide acceptance at home, and that abroad they will prove trustworthy ambassadors.

The text is explicit, and the illustrations are apt and clear. The publishers have done a characteristically excellent job. This could easily become the standard British cardiological Bædeker.

Disease and the Advancement of Basic Science. Edited by HENRY K. BEECHER. Cambridge, Massachusetts: Harvard University Press. London: Oxford University Press, 1960. Pp. 416. Illustrated. Price £5.

So much has been written in recent years about the primary importance of the basic sciences in medicine, that it almost comes as a shock to read a series of essays in which the writers acknowledge the vast debt of the basic scientist to the humble student of disease, and the enormous amount of basic research which has had its origin in the clinical field. This volume is an expansion of a series of Lowell lectures given in Boston, and is recommended to anyone interested in the complex interrelationships of the normal and the abnormal. The subjects discussed cover a wide range, from genetics to surgery, from vitamins to psychiatry. Every essayist has something of value to say, but some particularly striking examples are the beautiful exposition of molecular structure and disease by Linus Pauling (did you know that Sir Thomas Browne first used the word 'mutation'?), the essay on homœostatic mechanisms by Nathan Talbot, and the devastating critique of the never-never land of psychiatry by Percival Bailey: 'Here hypothesis is piled on unproven hypothesis until, from the top of the imposing edifice, one can no longer see the tenuous foundation'. Throughout the book there are hosts of examples in which the existence of a disease has been the starting point for the growth of an entire basic scientific field. Without diabetes, who would have been so interested

in carbohydrate metabolism? Without scurvy, rickets and beri-beri who would have bothered about the vitamins?

Readers should be warned that this is not light literature, and that the book needs careful study, for some of the subjects discussed are not easy to expound, but it is worth the effort.

Pregnancy and Diabetes Mellitus. By LARS HAGBARD, M.D. Springfield, Illinois: Charles C Thomas; Oxford: Blackwell Scientific Publications, 1961. Pp. 101. Illustrated. Price 54*s*.

THIS monograph fills a gap empty for far too long. It is packed with information, much being drawn from the author's experience of nearly 600 cases, and there is an extensive bibliography. The author is a Swedish obstetrician. He approaches the subject from all points of view, however, and there is an informative summary at the end of each section. The physician reader will be disappointed that only 1½ pages are devoted to the treatment of diabetes mellitus. Long-acting insulins are recommended, whereas many clinicians believe that better control can be achieved with two doses of soluble insulin daily. Line 8 on p. 81 recommends a diet containing 200 g. of 'glucose' by which is obviously meant carbohydrate, and nothing is said about the actual number of calories in the diet. No mention is made of the renal glycosuria of pregnancy which may indirectly cause severe hypoglycæmia, and many clinicians would disagree with the author that all the patients should be taught to test their own urine. Included is a glossary but no index. An unusual definition is that the neonatal period is the first week of life.

This is a good review of the subject, its only major failing being the lack of detail about the treatment of the diabetes itself.

Space and Sight. By M. VON SENDEN. Translated by Peter Heath. London: Methuen & Co. Ltd., 1960. Pp. 348. Price 42*s*.

TWO main questions are posed in this study of the task of supervising and observing the process of learning to see in persons 'born blind' (sic) who have been successfully operated on.

(1) 'Do the tactual impressions of the blind provide them with what can properly be described as an awareness of space in the same sense as the visual one?' and (2) 'How does spatial consciousness develop in congenitally blind persons after they have been operated on?' A large number of case histories are quoted and many conclusions drawn, but from the ophthalmologist's viewpoint the physical and physiological are often so subjected to the psychological that one becomes rather lost, wandering in realms of theory. The author's conclusions are most interesting and eminently readable. They include the deduction that depth perception obviously presents great difficulty for those newly brought to sight; their world was formerly all close around them, and they have no ordinary conception of space. To many the newfound faculty excites disgust, disappointment, and apathy. Their difficulties are recounted graphically, and experimental approaches and their results are described in detail. To those interested—and that must include all concerned with vision and its development and appreciation—it is impossible to summarize such a book; it must be read in full to be appreciated and properly assessed. The appendixes on Psychology (A. H. Riesen), Anatomy and Physiology (J. Z. Young) and Philosophy (G. J. Warnock) are equally fascinating; the latter's contribution contains the following pregnant passage: 'Thus there is plenty of conceptual spade-work here for philosophers to undertake, or for psychologists operating in a philosophical role. Only thus can one be in a position rightly to judge exactly what is established by such records as von Senden has assembled, or indeed, by any observations that may subsequently be made. For here, if anywhere, the record does not "speak for itself" '.

The translation from the German is impeccable—indeed a masterly piece of work, for the book, turgid in content, is easy to read. A very unusual production of considerable importance.

The Scientific Basis of Medicine: Annual Reviews 1961. London: University of London, The Athlone Press, 1961. Pp. 342. Illustrated. Price 40*s*.

IN actual fact, this is volume IX of the admirable series of 'Lectures on the Scientific Basis of Medicine' which have been published by the British Postgraduate Medical Federation since 1953. The change of title indicates no change of policy but, in the words of the preface, 'rather an attempt to introduce the series to a wider public'. Whether this will be achieved may be problematical. What matters from the point of view of the medical reader is that the contents are as good and as variegated as ever.

The volume includes 19 of the 30 lectures delivered between October 1959 and March 1960. The subjects range from the abstruse to the near-practical but, with perhaps the exception of the 19th, they will all be of interest to the clinician who wishes to keep in touch with what the back-room boys are doing. Isaacs on interferon, for instance, and R. H. S. Thomp-

son on the biochemistry of multiple sclerosis, deal with the ever-advancing front of two of the problems with which the practitioner is always engaged. The only pity is that the book could not be produced with less delay.

Dentistry for the Pre-school Child. By G. N. DAVIES, D.D.S., and RICHARD M. KING, B.D.S., M.S. Edinburgh: E. & S. Livingstone Ltd., 1961. Pp. 268. Illustrated. Price 32*s.* 6*d.*

THE authors of this compact book are to be congratulated, for so far little has been published on the dental needs of the pre-school child. It is a book that can be read with benefit by practitioner and student alike, and the chapter on 'Child management' is especially recommended to all who have to treat young children. There is much in the chapter on 'Interceptive orthodontics' that is theoretical rather than realistic. Appliances to maintain spaces following the extraction of deciduous teeth are but rarely required in practice, for, where these spaces close prematurely, the patients are usually those whose teeth are too large for the arch size and extractions are indicated eventually in any event. The subject of thumb-sucking, apart from its substitution with a 'dummy', surely does not require attention in the pre-school child? Is not the experience of most parents that their child ceases to suck a digit when school attendance begins? Those few cases (14% of all digit suckers) who eventually produce malarranged teeth usually abandon the habit as soon as an orthodontic appliance is worn in the mouth.

For anyone interested in the theories of tooth-decay, its treatment, and such preventive measures as the fluoridation of water supplies, these subjects are ably dealt with in the later chapters, and although this book is not large in size or price it will play an important part in furthering the dental health of children.

General Anæsthesia for Dental Surgery. By R. S. WALSH, B.M., F.F.A.R.C.S. London: Longmans, Green & Co. Ltd., 1960. Pp. 94. Illustrated. Price 21*s.*

IN view of the fact that 3,000,000 general anæsthetics for the extraction of teeth are administered annually in England and Wales, Dr. Walsh's excellent little book will be of considerable interest to general practitioners and dentists, as well as to the professional anæsthetist. Obviously based on extensive first-hand experience, the book describes the standard methods employed for the administration of nitrous oxide and oxygen, and goes on to discuss the special methods required for children and resistant patients; another chapter deals with the assessment of fitness and draws attention to the added dangers of hypoxia in the presence of disease.

Minor criticism might be made on the grounds that no mention is made of Mason's mouth-gag, except as an emergency rib spreader for patients requiring cardiac massage; also, the state of 'amnalgesia' described by Tom is reached after approximately 40 breaths, not 40 to 50 seconds as stated in chapter eleven. The section dealing with anæsthetic emergencies is both comprehensive and terrifying, and should do much to discourage those who regard the administration of 'dental gas' as an elementary exercise in asphyxia.

Nitrous Oxide in Dentistry. By J. G. BOURNE, M.A., M.D., F.F.A.R.C.S. London: Lloyd-Luke (Medical Books) Ltd., 1960. Pp. 181. Illustrated. Price 30*s.*

THIS is a book in which anæsthetists will find much to interest them. The author stresses the evils of hypoxia and does much to recommend the use of cyclopropane, which he claims can be made non-explosive by using a mixture consisting of 50 per cent. cyclopropane, 25 per cent. oxygen and 25 per cent. nitrogen. He admits that cyclopropane is apt to cause nausea but does not consider this a serious drawback. The reviewer feels that in his enthusiasm for cyclopropane, the author may have been unintentionally hard on nitrous oxide, which has served us well for over 100 years. After all, there is a difference between nitrous-oxide anæsthesia and the hypoxia which is sometimes made to accompany it by the inexpert. Dr. Bourne writes clearly and the book is most readable and excellently produced. It is well worth careful study for it is obvious that the author has gone very deeply into the subject.

The Evolution of Medical Practice in Britain. Edited by F. N. L. POYNTER. London: Pitman Medical Publishing Co. Ltd., 1961. Pp. 168. Price 25*s.*

WHAT are the forces shaping the pattern of medical practice in a country? Are they ethnic, economic or sociological? Some light on this fascinating but speculative theme is shed in this symposium, in which certain factors in the development of medical practice in England are analysed. The papers were originally given at the First British Congress on the History of Medicine held in 1960 under the auspices of the Society of Apothecaries. Dr. Poynter, who was secretary of the Congress, has acted as editor and contributed a paper on governmental influence, picking out highlights from the history of legislation from the first petition for the

regulation of medical practice approved by parliament a few years after Agincourt.

Newman has produced a gem of a paper on the influence of medical education, full of witty and wise remarks, and other contributors deal with the roles of the three Royal Colleges, including a hilarious account of the examination of an abysmally ignorant candidate by one of the Colleges in 1609. A brief history of the influence of medical societies gives due credit to the great Hastings, and others discuss the parts played by clinical research, the pharmaceutical industry, rural practitioners and, last but by no means least, the Scots—without whom British medical practice would presumably have remained a poor thing.

The Conquest of Pain. By RONALD WOOLMER. London: Cassell & Co. Ltd., 1961. Pp. 171. Illustrated. Price 18*s*.

By the conquest of pain, the first barrier to surgical enterprise was removed. Professor Woolmer, director of anæsthetic research in the Royal College of Surgeons of England, is particularly well qualified by his position to write on this subject, and by his gifts as a writer to produce a fascinating book. He writes for the intelligent layman who is interested in scientific advance, and who wishes to understand principles rather than dive into details. He has a gift for the use of homely but pertinent similes, and a sense of humour that enlivens but does not obtrude. He deals with the history of the relief of pain, and with the greatly enlarged scope of the modern anæsthetist, who must make even the severest operation safe and pleasant for the patient and easy for the surgeon, and who must anticipate, and deal with as they arise, the difficulties and dangers that may appear in its course.

NEW EDITIONS

Treatment of Cancer and Allied Diseases. Vol. IV. *Tumours of the Breast, Chest and Œsophagus*, edited by George T. Pack, M.D., F.A.C.S., and Irving M. Ariel, M.D., F.A.C.S. (Pitman Medical Publishing Co. Ltd., £12), in its second edition comprises more than 600 pages of text, illustrations and references: it is well printed upon good paper, and contains a large number of excellent illustrations. There are more than 40 contributors and practically all are well-known American surgeons. The editors have grouped these particular subjects together because they regard them as subdivisions of thoracic surgery in which the lessons learnt in one region should now be available to the others. There are chapters concerning the physiological principles that confront any surgeon who 'opens the chest' and much information about the pathology and the etiology of all the conditions mentioned. There are also long sections devoted to the details of surgical techniques. On the whole the general approach to the problems of malignant disease is handled aggressively and one gathers that very radical procedures are viewed favourably. The relative merits of radiotherapy, chemotherapy and surgery are discussed in detail, and there are many statistics concerning prognosis in various circumstances. This book is too detailed for students; but it is valuable as a work of reference for any surgeon who does thoracic and breast operations.

Textbook of Pathology, by William Boyd, M.D., F.R.C.P., F.R.C.P.ED., in its seventh edition (Henry Kimpton, £6 6*s*.) maintains the sparkle of previous editions. To those of us born and bred professionally on Muir's eminently sound, but pedantically dull, book, Boyd's book has always had a surreptitious attraction. The younger generation need have no such qualms. This extensively revised new edition contains all the essentials, provided in considerable detail, freely illustrated (792 black and white illustrations and 20 coloured plates), and presented in a style which will appeal to all but the pedant. The expert may well be able to detect errors, but for the ordinary clinician, medical student or postgraduate it is a book worth owning.

Introduction to Dental Anatomy, by James Henderson Scott, M.D., D.SC., L.D.S., and Norman Barrington Bray Symons, M.SC., B.D.S., third edition (E. & S. Livingstone Ltd., 45*s*.).—A third edition within eight years emphasizes the popularity and need of this modern textbook. This edition streamlines the rewritten text of the previous edition and is now neatly divided into five main sections. The section on functional anatomy of the oral cavity contains considerable new material and is an excellent addition. The clinical correlation is an attractive feature of the book as is the up-to-date bibliography. Several new illustrations have been added and the text remains easy to read. Now firmly established as a standard textbook in the dental course, it should remain an essential on the bookshelf of undergraduate and postgraduate alike.

The contents of the December issue, which will contain a symposium on 'Respiratory Disorders', will be found on page A 154 at the end of the advertisement section.

Notes and Preparations see page 729.
Notes from the Continent see page 733.
Fifty Years Ago see page 735.
World Health News see page A 15.
Motoring Notes see page A 101.
Travel Notes see page A 109.
Bridge Notes see page A 113.
From a Sussex Window see page A 115.

NOTES AND PREPARATIONS

NEW PREPARATIONS

'ACDRILE' tablets each contain 0.1 g. of cysteine methyl ester hydrochloride and are intended for the treatment of chronic bronchitis and other respiratory-tract conditions. They are said to be of value particularly in the long-term treatment of chronic bronchitis. Available in bottles of 28 enteric-coated tablets. (Berk Pharmaceuticals Ltd., Berk House, 8 Baker Street, London, W.1.)

'ASILONE' tablets each contain 0.25 g. of a polymethylsiloxane and are intended for the treatment of intestinal distension and heartburn. Side-effects are said to be minimal. Available in polystyrene boxes of 12 tablets. (Berk Pharmaceuticals Ltd., Berk House, 8 Baker Street, London, W.1.)

'BENURIDE' tablets each contain 200 mg. of phenylethylacetylurea, and are intended for the treatment of epilepsy, 'particularly the temporal lobe variety'. Because of its mild stimulant action the manufacturers advise that it should be combined with phenobarbitone. Available in containers of 100 and 500 tablets. (Bengué & Co. Ltd., Mount Pleasant, Alperton, Wembley, Middlesex.)

'COOLSPRAY' contains 20% of dichlorodifluoromethane and 80% of trichlorofluoromethane and is intended for the alleviation of pain due to muscular spasm. It is said to be a 'particularly effective form of counter-irritation, thus reducing the need for sedative or analgesic drugs'. Available in aerosol containers of 5 fluid ounces (142 ml.). (Bengué & Co. Ltd., Mount Pleasant, Alperton, Wembley, Middlesex.)

'COSALDON' tablets each contain 200 mg. of a new xanthine derivative, SK7 (1-hexyl 3:7 dimethylxanthine) and 50 mg. of nicotinic acid, and are intended for the treatment of 'cerebral sclerosis'. It is claimed that 'in about 70% of cases the results in terms of remission of symptoms can be very gratifying'. Available in bottles of 100 tablets. (West Pharmaceutical Co. Ltd., 9 Palmeira Mansions, Church Road, Hove 3, Sussex.)

'TRIOGESIC' tablets each contain 25 mg. of 'triominic' (50% phenylpropanolamine hydrochloride, 25% mepyramine maleate and 25% pheniramine maleate) and 500 mg. of paracetamol and are said to give prompt symptomatic relief in 'all catarrhal conditions above the neck', when these are complicated by pain. Also available in the form of a suspension (for children and older adults), each 4 ml. of which contains 12.5 mg. of 'triominic' and 250 mg. of paracetamol. (A. Wander Ltd., 42 Upper Grosvenor Street, Grosvenor Square, London, W.1.)

'ULTRAPEN' tablets contain propicillin (alpha phenoxypropyl penicillin potassium), an oral penicillin, which is said to produce higher peak blood levels, greater serum antibacterial activity, greater activity against streptococci and staphylococci, with less likelihood of the development of resistance. Available as scored tablets of 125 mg. or 250 mg. in bottles of 20 and 100. (Harvey Pharmaceuticals, Pfizer Ltd., Sandwich, Kent.)

PHARMACEUTICAL NOTES

BURROUGHS WELLCOME & CO. announce that suppositories have now been added to their 'valoid' range of anti-emetic products for use 'whenever the oral or parenteral routes are precluded'. Available in a strength of 100 mg. or 50 mg. (for pædiatric use) in packs of 10. (The Wellcome Building, Euston Road, London, N.W.1.)

GLAXO LABORATORIES LTD. announce that their 1961/62 influenza vaccine, 'invirin', is now available. This contains the Asian strain and the 'B' strain as in their previous vaccines, with the addition of a third strain, A/England/1/61. Available in ampoules of 1 ml., in boxes of 1 and 6. (Greenford, Middlesex.)

PFIZER LTD. announce that their 1961/62 influenza vaccine 'flubron' is now available. This contains the two strains A/Asian/Singapore and B/England/1959. Available in ampoules of 1 ml., singly or in boxes of 6, and in vials of 10 ml. (Sandwich, Kent.)

A. H. ROBINS CO. LTD. announce that their antitussive expectorant preparation, 'robitussin', is now available in an additional size: bottles of 2½ fluid ounces (71 ml.). (5 Fenchurch Street, London, E.C.3.)

ROUSSEL LABORATORIES LTD. announce the introduction of: (i) 'decaserpyl plus' tablets containing 10 mg. of 'decaserpyl' (methoserpidine) and 20 mg. of benzthiazide. Available in cartons of 20 and 100 tablets packed in metal foil. (ii) 'lotio hydrocort', a preparation of hydrocortisone for topical application, which is said to be 'superior in blandness and spreading power to any previously available'. To distinguish it from 'hydrocortisyl skin lotion' it will be packed in a green carton. Available in strengths of 0.5% and 1%, in bottles of 20 ml. (847 Harrow Road, London, N.W.10.)

FILM NEWS

Aerosols in Medicine (16 mm., colour, sound, running time 22 minutes) is designed to provide members of the medical, pharmaceutical and nursing professions with 'a general background to the preparation and application of aerosols in medicine'. Produced by Cygnet Films and available on free loan from the Medical Services Department, Riker Laboratories Ltd., Loughborough, Leicestershire.)

Allergy (16 mm., colour, sound; running time 30 minutes) deals with the problem of the diagnosis and treatment of allergic conditions, and replaces an earlier film entitled 'Allergic Diseases in Man'. Available on free loan for showing to medical audiences upon application to the Bencard Allergy Division, Beecham Research Laboratories, Brentford, Middlesex.

E. R. Squibb & Sons Ltd. announce that their new catalogue of medical and surgical films for professional audiences, films of medical interest to lay audiences, and veterinary films, all of which are available on free loan, is now available upon application to their Professional Services Department at Edwards Lane, Speke, Liverpool 24.

FORTHCOMING CONFERENCES

The Place of the General Practitioner in Therapeutic Research will be the subject of discussion at a joint meeting to be held by the Association of Medical Advisers in the Pharmaceutical Industry and the Research Section of the College of General Practitioners at the Royal Society of Medicine, on November 2, 1961, at 6 p.m. General practitioners interested in this topic are welcome to attend the discussion.

The *Third International Congress on Infective Pathology* will be held in Bucarest in September 1962. Full details may be obtained from Professor S Nicolau, via Parizi 7, Bucarest.

ROYAL SOCIETY OF MEDICINE

THE next meeting of the Section of General Practice will be held at 8.15 p.m. on Wednesday, November 15, when the subject for discussion will be 'Diabetes Mellitus'. The opening speakers will be Dr. J. B. N. Nabarro, Dr. J. Vallance-Owen, and Dr. D. L. Crombie.

CHRISTMAS GIFTS FUND APPEAL

THE President of the Royal Medical Benevolent Fund writes:—'I should be grateful if you would allow me space to make the customary annual appeal to enable the Royal Medical Benevolent Fund to send a Christmas gift to each of the Fund's regular beneficiaries. The Fund does remarkably good work by providing grants and annuities to those members of our profession and their near relatives whom misfortune has rendered unable to provide for themselves, but this does not allow for any extra expenditure at Christmas. That is why this special appeal is made. The medical profession is generous-minded and I am sure that it will only need this reminder to ensure a liberal response sufficient to gladden the hearts of our beneficiaries this Christmas'. Contributions marked 'Christmas Gifts' should be sent to the Royal Medical Benevolent Fund, 37 St. George's Road, Wimbledon, London, S.W.19.

EMERGENCY BED SERVICE

CONCERN at the large number of maternity cases handled during the year is again expressed in the recently published annual report of the Emergency Bed Service of the King Edward's Hospital Fund for London for the year ended March 31, 1961. The 'qualified optimism' regarding this problem expressed in the last report has 'proved unfounded' and an analysis of the number of such cases handled during the year showed that 'in no less than 52% of cases the patient had attended her general practitioner or local antenatal clinic, as a result of which it was known well beforehand that hospital confinement would be necessary on social grounds. It seems absurd that in so many cases it should prove impossible to book a bed for these patients in advance, and that they should in consequence have to be admitted as "emergencies" after labour has started'.

STEPPING STONES HOUSE

STEPPING Stones House is one of four houses occupied by the Bromley Hospital. It was purchased, converted, furnished and equipped out of a grant of £17,000 made by the King Edward's Hospital Fund for London, and it was opened on September 1, 1957, as the psychiatric outpatient clinic of the Hospital and the home of the Stepping Stones Club. A report on what has been achieved during the first three years, which has just been published, provides fascinating reading. Particularly does this apply to the section of the report describing the activities of the Stepping Stones Club. The Club has now a membership of 560, of whom not less than 250 take an active part in the various club functions. Its purpose is to offer various forms of activity to mentally sick patients, and its membership consists of mentally sick patients and voluntary helpers recruited from the local community. One of the unique features of this club is that all members enjoy equal status and, in so far as it is possible in

these circumstances, neither patients nor helpers are allowed to know which club members are patients and which are helpers. Copies of the report can be obtained from the Department of Psychiatry, Bromley Hospital, Bromley, Kent.

MUSIC THERAPY

THE Society for Music Therapy and Remedial Music, which held a one-day conference last month on 'Music Therapy in Hospitals and Hospital Schools', was founded in 1958 with the object of promoting the use and development of music therapy and remedial music in the treatment, education, training and rehabilitation of children and adults suffering from emotional, physical or mental handicaps. It has enrolled amongst its members musicians, physicians, educationists, psychologists, teachers, social workers, nurses, and students. Full details can be obtained from the Honorary Secretary: Miss Juliette Alvin, 6 Westbourne Park Road, London, W.2.

PHOTOPERIODICITY OF POLIOMYELITIS

THE regular periodicity of outbreaks of poliomyelitis throughout the world may be governed, to some extent, by the length of the daylight period, according to Professor van Loghem of Amsterdam (*Lancet*, 1961, **ii**, 706). He bases his hypothesis on figures taken from the World Health Organization's Epidemiological Reports. These can be used to demonstrate that the annual pre-epidemic rise in the incidence of poliomyelitis begins simultaneously in all the countries in the northern hemisphere round about March or April; whereas in the southern hemisphere the corresponding increase begins in September. In countries near the equator the incidence of the disease is not subject to seasonal variations. Meteorological conditions are too erratic for any one of them to be held accountable for this remarkable phenomenon but the author suggests that it can be related to changing lengths of days as the seasons come round.

DENTAL HEALTH CAMPAIGN

WHAT is described as 'Britain's biggest dental health campaign' is to be initiated in South-East Scotland next January. The campaign, which will last for around two months, is primarily aimed at 120,000 schoolchildren in the 5 to 11 plus age-group, and it will call for brushing of the teeth the last thing at night, mouth rinsing after snacks, the eating of fruit after meals, and regular visits to the dentist.

TOOTHBRUSH HYGIENE

THE criticism that the use of a toothbrush is undesirable on hygienic grounds receives little support from T. H. Melville who carried out some experiments to obtain the figures for the numbers of bacteria still remaining on toothbrushes up to twenty-four hours after use (*Brit. dent. J.*, 1961, **111**, 90). Bacterial counts were made from the brushes immediately after use, after an interval of six hours, and twenty-four hours after use. Half the subjects used toothpaste; the others used plain water only. Finding that the total number of viable bacteria that can be recovered from the washings of toothbrushes was subject to 'considerable variation' Melville considers that this is 'probably due' to the thoroughness or lack of thoroughness with which the brush is rinsed after use. The effect of toothpaste was rather uncertain because of its tendency to inhibit the growth of bacteria on the media, but on the whole the number of viable bacteria counted was 'considerably less' when toothpaste was used. Compared with the numbers of bacteria in saliva the viable counts in the washings from toothbrushes were very low. The highest count obtained was 135 million—in the washings from a freshly used brush: a figure equivalent to the average count on 0.2 ml. of saliva; after six hours the highest recorded figure was less than 1 million 'or only slightly more than the average count to be expected from 0.001 ml. of saliva'.

TEETH IN THE NEWBORN

IN Britain, about 1 infant in 2000 has one or more teeth erupted at birth, according to J. H. Gardiner (*Proc. Roy. Soc. Med.*, 1961, **54**, 504), who has followed the dental fortunes of 12 such children over a number of years. He confirms the general view that these are true deciduous teeth that have erupted early and not, as occasionally suggested, pre-deciduous or extra teeth. This strange condition shows a distinct tendency to run in families in which a genetic factor may result in the tooth germ in the region of the symphysis menti becoming too superficial in position. Unless difficulties with breast feeding arise, or ulceration of the underside of the tongue develops, the teeth are probably best left. Early shedding is usual, although they may be retained until the age of five or six.

PUBLICATIONS

The Making of a Surgeon, by Ian Aird, CH.M., F.R.C.S.—It is quite remarkable how much of interest and of factual information has been crammed into this short book; but the author has in the past given evidence of an ability for condensation without loss of clarity that amounts almost to genius. The whole training of a surgeon, and the opportunities that are open to him at the end of his training are put clearly

and sympathetically. Of all the sections, that dealing with the training in special surgery will prove of the greatest help to a young man planning the later steps of his career, and to those who wish to advise or guide him. (Butterworth & Co. (Publishers) Ltd., price 12*s.* 6*d.*)

Essays on the First Hundred Years of Anæsthesia. Vol. II, by W. Stanley Sykes, M.B.E., M.B., D.A., may not have as wide an appeal as the first volume (*The Practitioner*, 1960, **185**, 379), but it will prove of as great interest to anæsthetists. Chloroform is still the black sheep of the anæsthetic family, but it does not dominate the scene as it did in the first volume. With the exception of the chapter on 'Anæsthesia and the cardiologists', which is disappointing, the book is a mass of valuable and often otherwise inaccessible information couched in language which is never dull. (E. & S. Livingstone Ltd., price 30*s.*)

Essentials of Medicine for Dental Students, by A. C. Kennedy, M.D., M.R.C.P.ED., F.R.F.P.S., is unique in its scope and provides the dental student with the essentials of medicine from the dental point of view. Those conditions of special interest to him are covered in more detail and space is given to the consideration of drugs in common use. The book is written with authority. It is exceptionally well planned, well laid out and produced, and thoroughly readable. It can be recommended to any dental student before, during and after the time he devotes to the study of medicine. (E. & S. Livingstone Ltd., price 25*s.*)

Fluoridation: Errors and Omissions in Experimental Trials, by P. R. N. Sutton, D.D.SC., L.D.S., is a statistical, and not very impressive, analysis of certain American and Canadian reports on the fluoridation of public water supplies. Doctors, and especially medical officers of health, ought to be aware of its existence because it is likely to loom large in the writings of those who are opposed to this valuable public-health attack on the problem of dental caries. (Cambridge University Press, price 8*s.* 6*d.*)

The Ship That Would not Travel Due West, by David Leslie, M.B., CH.B., is a most readable book: an adventure story, written by one who took part in the single-handed sailing race across the Atlantic. It is reviewed in *The Practitioner* for two reasons. First, because it is a psychological study. What drives a man to test himself to possible destruction under conditions when the enemy is impersonal and inexorable, and no reprieve is possible? What are his reactions in the circumstances? And secondly, because doctors in their leisure moments have enjoyed reading the logs of deep-sea cruises ever since Claude Worth of Bart's wrote of his voyages in The Tern. (Temple Press Ltd., price 21*s.*)

Mining Town Doctor, by Peter Kennedy, consists of the reminiscences of a general practitioner in a small mining town in the Transvaal. Its moral is that fundamentally general practice is, or at least was, the same the Commonwealth over. Nevertheless, the book will be read with interest by his fellow-practitioners in Britain, especially as the superficial differences often give an interesting twist to the tale. Written in an easy style, it can be prescribed to while away the leisure hour. (Peter Davies Ltd., price 16*s.*)

OFFICIAL PUBLICATIONS

Cerebral Infarction: The Role of Stenosis of the Extracranial Cerebral Arteries (Medical Research Council Special Report Series No. 300), by Peter O. Yates and Edward C. Hutchinson, examines in detail the role of stenosis of the extracranial cerebral arteries in the production of infarction of the brain. In England and Wales 14% of the total mortality in 1959 was ascribed to cerebrovascular disease and, according to the Registrar General's analysis, about half of these deaths were due to cerebral infarction. The present investigation, which is based upon 100 cases of suspected cerebral ischæmia, was prompted, in part at least, by the well-known fact that examination of the local cerebral arteries often fails to reveal the presence of significant lesions. 'Serious obstruction' of the extracranial arteries was found in some 90% of the 35 proved cases of infarction, a finding which the authors claim should suggest that surgery may have a wider application in the early stages of cerebrovascular disease than has been generally recognized, but that it requires the utmost precision in diagnosis. The report is illustrated with photographs of unusual clarity. (H.M. Stationery Office, price 14*s.*)

National Health Service Superannuation Scheme (England and Wales) is a revised version of the booklet first published in 1948 to explain the details of the N.H.S. superannuation scheme. A copy of the booklet is issued free to every person on first entering the Health Service. Further copies may be obtained from H.M. Stationery Office, price 1*s.*

CORRIGENDUM.—Dr. D. P. CUTHBERTSON has asked us to state that in his article in our August issue (p. 163, line 39) the word 'minimum' should read 'maximum'.

NOTES FROM THE CONTINENT

A European Newsletter

BELGIUM

Hæmolytic disease in the newborn.—According to Dr. P. O. Hubinot, of Brussels University, hæmolytic disease of the newborn is only one aspect of the general problem of the transmission of passive immunity from the mother to the fœtus. Once the antibodies have been formed in the maternal circulation there is no practicable method whereby their passage into the fœtal blood stream can be prevented. The prevention of iso-immunization essentially involves the avoidance of contact with antigens (such as the Rhesus factor), and the commonest circumstances in which exposure to such antigens is apt to occur include blood transfusion and pregnancy. The author refers to the importance of preventing miscarriages and of avoiding any blood transfusions that are not imperative. Whilst the treatment of hæmolytic disease is now well established and the percentage of successes is considerable there still remains the problem of the most serious variety of the disease, namely hydrops fœtalis. The only course to be adopted here, according to Hubinot, is to terminate the pregnancy and he discusses in detail the indications for this procedure.

E.C.T. and reserpine.—Work done by Dr. Y. Piette and Dr. A. F. de Schaepdryver at the University of Gand has thrown fresh light on the mechanism of serious injury or sudden death that sometimes occurs in patients taking reserpine who undergo electroconvulsive therapy. Experiments on reserpinized rabbits support the view that these catastrophes are brought about as a result of a sudden fall of blood pressure believed to be due to a diminution in the body's reserves of noradrenaline and adrenaline. This leads to respiratory arrest and prolonged anoxia so that the sympathetic control of arterial tension is abolished. The collapse of the blood pressure is believed to be caused by vagal stimulation, and is accentuated by the accumulation of vasodilating metabolites. These unfortunate consequences can be avoided, the authors claim, by the previous administration of atropine and relaxants, with controlled respiration. The results of this experimental work have been confirmed in patients by Piette and his colleagues.

Human tuberculosis from animal sources.—Tuberculosis among domestic animals (excluding the bovines) and its relation to the disease in man was the subject of a lecture given recently by Professor A. Verstraete of the University of Gand. Although in the last few years the importance of tuberculosis in cats and dogs has gained recognition it is now clear that the source of their infection is often to be found among the adults who may be living in the house, for in a growing number of instances the infecting organism is the human type of *M. tuberculosis*. Parrots, budgerigars, pigeons and poultry may also become tuberculous, the latter presenting a special risk to human beings, who may become infected by eating their eggs or by developing tuberculous ulcers in the mouth caused by splinters of bone from infected birds that have not been properly cooked. Pork may also act as a source of infection to man on occasions. Professor Verstraete takes the view that tuberculosis in domestic or farmyard animals should be compulsorily notifiable as an important step in the desirable collaboration of human and veterinary medicine in this field.

Weaning.—In a study of breastfeeding M.E.-A. Sand of Brussels University reported that by the age of 2 months half the babies had been weaned from the breast, whilst at 3 months more than two-thirds were artificially fed. Remarking that these figures compare unfavourably with those from England or Sweden the author considers that subconscious factors, as well as the deliberate choice of the mother, may play an important part in suppression of lactation. Whilst there was little to suggest that the incidence of illness among the infants was in any way related to the age at which they were weaned there did appear to be a significant difference between those who had been artificially fed from the start and those who had been breast fed even for a short time. The health record of the latter group, in respect of both serious and trivial illnesses, was distinctly better. This difference remained even when allowance had been made for other factors which were thought likely to have had an influence on the health of these infants.

GERMANY

Smallpox danger.—Because of the great increase in travel, smallpox, for many years regarded as virtually extinct, has again become a real problem in some parts of Germany, according to A. Herrlich and his colleagues. They describe an outbreak that occurred earlier this year in Ansbach in which a returning traveller was the source of the infection. This man had been

vaccinated in the past and it appeared that, although he was vaccinated shortly before going to India, the vaccination did not take. This important fact was overlooked because the International regulations do not require the inspection of the results of these vaccinations. The resulting outbreak is described and the authors mention the measures taken to ensure the isolation and protection of susceptible individuals. Two groups of persons were unfortunately neglected: namely the mortuary attendants and the cemetery personnel, but difficulty was avoided in the case of the only patient who died by using the doctors and nurses from the isolation hospital as pall-bearers.

Diet and diabetes mellitus.—Only 62 out of 500 diabetics who replied to a questionnaire about their dietary habits were accustomed to calculate their food intake accurately, according to H. Mehnert, Chief of the diabetic clinic at the Munich University Medical Polyclinic. Emphasizing that a satisfactory diabetic regime is hardly possible without the ordering and keeping of a carefully worked-out diet he records that of the 500 patients who took part, 24 were not on any diet, 50 reduced or sometimes eliminated sugar and sugar-containing foods, whilst 161 declared that, although they were advised to limit fats and sugars, they had been given no exact dietary instructions. Of the remainder, 95 were given a typed diet sheet which, they complained, made no allowance for individual preferences; and no fewer than 108 who were given more detailed advice declared that they were unable to avoid errors in regulating their intake of calories because they found the necessary calculations too difficult. The author considers that the full authority of the doctor in charge of the patient is of such importance that the teaching of dietary requirements should never be delegated to the nursing staff or others. Using models of different foodstuffs the patients are shown how to construct their own diets so that they correspond with the quantities authorized. The advantages of small meals taken at frequent intervals are stressed, especially on account of the greater stability of blood-sugar levels than when conventional timings and amounts are observed.

Preparation for sigmoidoscopy.—A method of clearing the lower bowel which does not require the use of any purgative or previous enema is described by H. E. Köhnlein, who reports that it results in complete emptying of the last 25 cm. and leaves the mucous membrane clean and easily visible. The technique consists of injecting into the rectum 125 ml. of a mixture of 16% sodium biphosphate and 6% sodium phosphate solutions, prepared in a plastic bottle to which a flexible neck is attached, with the patient remaining in the left lateral position for five minutes. In the following half-hour the lower bowel is emptied and the author states that this procedure, which has now been adopted in the surgical clinics at Freiburg University with good results, does not give rise to any mucosal irritation. It is considered suitable for children as well as adults but the quantities used must be correspondingly smaller.

Contaminated coconut.—Recent evidence in this country of the danger of salmonella organisms contaminating imported coconut is confirmed in Germany in a report by H. Gärtner and I. Böhlck, who found paratyphoid organisms in 17 samples of shredded nut and coconut confectionery. Some of the strains had not previously been encountered and the investigation showed that a wide range of salmonella types must be reckoned with. In one case there was a positive finding in cooked macaroons which is regarded as important as it shows that the danger of infection may still be present despite cooking. The authors stress that the examination of amounts as large as 50 to 150 g. of a shipment does not necessarily afford complete assurance that all is well because the organisms are not likely to be spread evenly throughout the consignment. They draw attention to the importance of taking this possible source of infection into account in the investigation of any fresh outbreak of salmonella food poisoning.

Dark glasses.—The importance of high quality sunglasses has been emphasized by H. Schober who points out that inexpensive makes are liable to produce harmful eye-strain on account of the refractive errors from which they are seldom entirely free. If worn for long periods of time the sustained effort of overcoming the effects of optical faults may occasionally damage the eyes. In addition he draws attention to the need for those individuals who already have refractive errors to wear dark lenses of the appropriate formula to correct the defect or, alternatively, to wear their ordinary clear glasses as well as the tinted ones. In many sports and recreations, for example motor racing, mountaineering and athletics generally, sunglasses are often a necessity and Schober recommends that expert advice in choosing the most suitable kind should be a routine precaution.

'Notes from the Continent' are produced in collaboration with the Editors of *Bruxelles-Médical* (Belgium), *Le Concours Médical* (France), *Münchener Medizinische Wochenschrift* (Germany), and *Minerva Medica* (Italy).

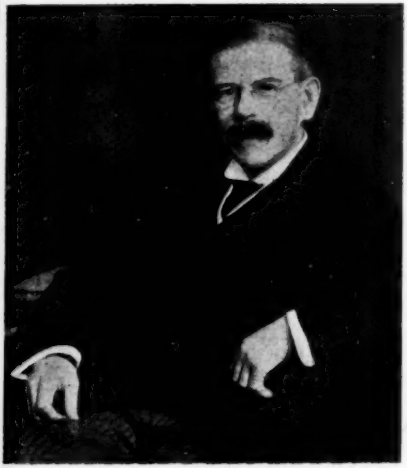
THE PRACTITIONER

Fifty Years Ago

NOVEMBER 1911

'We are betrayed by what is false within'.—George Meredith: *Modern Love*

C. B. LOCKWOOD, F.R.C.S., Surgeon to St. Bartholomew's Hospital, remarks in 'Appendicitis in its relation to diseases of the female pelvic organs', on 'the frequency with which the vermiform appendix is found within the true pelvis . . . when there is reason to suspect the



Herbert J. Paterson, C.B.E., M.C., M.D., F.R.C.S. (1868-1940)

pelvic contents, then the outer rectus incision can be made; the right Fallopian tube and ovary or a small tumour can be dealt with through this . . . if clinical examination discloses . . . something very serious inside the pelvis, the inner rectus incision gives full command of the pelvis and sufficient access to the appendicular region'.

In 'The therapeutic promise of the internal secretions', Leonard Williams, M.D., M.R.C.P., Physician to the French Hospital; Assistant Physician to the Metropolitan Hospital, begins: 'With the faulty perspective which is one of the engaging vices of the true pioneer, Sir Almroth Wright has . . . invited physicians to abandon clinical methods and give themselves over to the study of bacteria and their appropriate vaccines . . . we have not only allowed the microbe to dominate our thoughts, but we have besought him with outstretched hands to come and rule over us . . . We are asked to believe that he is omniscient, ubiquitous and ever present . . . whereas he is in reality merely a jack in office who exhibits in their highest degree the offensive attributes of the parvenu'. Williams's main concern, however, is with the cause and treatment of exophthalmic goitre. He refers to 'four symptoms of fully developed myxœdema which are invariably found in jaundice . . . the yellow tint of the skin and conjunctivæ . . . the slow pulse . . . subnormal temperature . . . physical lethargy'. He suggests that if 'the condition of the blood in jaundice could in some degree be imitated artificially, it might be possible to control the tachycardia and reduce the mental excitability' in patients with Graves's disease. Treatment along these lines, it is suggested, holds promise of success. Patients have 'been cured, not of symptoms only, but of every manifestation of the disease, by the intramuscular injection of bile-salts'.

A. J. Jex-Blake, M.A., M.B., Assistant Physician to the Brompton Hospital and to St. George's Hospital, writing 'On spitting blood', comments that 'the public at large is apt to take blood-spitting as evidence of consumption of the lungs, or pulmonary tuberculosis'. He adds:—'I shall hope to show that this is far from being the case, at any rate as far as concerns the outpatients attending the hospital'. He then goes on to report that of 909 cases of hæmoptysis seen as outpatients at the Brompton Hospital, only 497 were cases of pulmonary tuberculosis, whilst 322 were cases of bronchitis and emphysema. Discussing diagnosis he writes: 'The vomiting of blood and bleeding from the nose, both common events, should be excluded to begin with. If it is found that the spitting of blood occurred only after a prolonged bout of coughing, it is likely that the blood came from the nasopharynx or pharynx. If it occurred spontaneously, and if the first thing the patient was aware of was the presence of blood or a salt taste in the mouth, and if the hæmoptysis went on for some hours or days and was not small in amount, tuberculosis of the lungs is the probable cause'.

In his article on 'Hour-glass stomach', Herbert J. Paterson, M.C., M.B., F.R.C.S., Assistant Surgeon to the London Temperance Hospital, writes: 'I have never found any free HCl in a case of hour-glass stomach. I have not seen this mentioned by previous writers. It is an important fact, as the absence of free HCl frequently leads to a diagnosis of malignant disease'. He expresses the opinion that 'Opera-

tion for hour-glass stomach should be a rare operation, as the patients should be treated surgically long before the ulcer has progressed to the extent of producing marked constriction of the stomach'.

Son of an Argyllshire doctor, Paterson went from Trinity College, Cambridge, to St. Bartholomew's Hospital as senior entrance scholar in 1890. He qualified in 1893, took the F.R.C.S. in 1897, M.Ch. in 1910, and the Cambridge M.D. in 1925. Awarded the Jacksonian Prize in 1904, he was Hunterian Professor of Surgery in 1906. Appointed Assistant Surgeon to the London Temperance Hospital in 1901, he retired after many years as senior surgeon, and was emeritus surgeon at his death in 1940. Honorary Surgeon to Queen Alexandra's Hospital for Officers during the 1914-18 War, he was also surgeon to the King Edward VII Hospital for Officers and to the Ministry of Pensions Hospital. An examiner at Glasgow and at Cambridge, he was active in the affairs of the Fellowship of Medicine and of the Royal British Nurses Association. He edited and practically re-wrote the 1904 edition of Walsham's 'Handbook of Surgical Pathology', and wrote an eminently practical work on 'Indigestion: its Differential Diagnosis and Treatment', 1929. His Hunterian lectures on gastric surgery and those on cancer delivered under the auspices of the Fellowship of Medicine were also published. A surgeon always prepared to try medical means before resorting to operative interference, he had a large consultant practice and was esteemed for his modesty and wide culture. 'A Surgeon Looks Back', published posthumously, was an entertaining account of a useful career which began when operations were still performed under primitive conditions.

In a review of children's diseases, Hugh Thursfield, M.D., F.R.C.P., Assistant Physician, The Hospital for Sick Children, Great Ormond Street, W.C., draws attention to 'two points of supreme importance' in epidemics of poliomyelitis. 'The first is that the actual mortality of the disease . . . usually very low indeed, becomes very considerable . . . so altering the prognosis that special care must be taken in times of epidemic to emphasize the seriousness of the condition. The second, and even more important point, is that the onset of many of these epidemic cases is entirely unlike the usual history'. The review ends with a reference to the Quinton sea-water injections in intestinal infections in infants. There is 'no reason to suppose that the Quinton treatment does anything but good . . . but it is a regrettable incident that the daily press cannot obtain more accurate information about the medical subjects which it chooses to discuss'. He regrets advertising which seem to 'reflect upon . . . modes of treatment . . . practised by the remainder of the medical profession'. T. H. B.

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